Benefits and limitations of local food economies to promote sustainability: A Stellenbosch Case Study

by

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Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

March 2010

Abstract

The main aims of this thesis were to investigate the benefits and limitations of local food economies in promoting sustainability through a review of the literature and an assessment of the current status of the food production, distribution and consumption in Stellenbosch in order to make recommendations for promoting greater sustainability through Stellenbosch's food system.

A review of the literature found that the modern food system has promoted the externalisation of social and environmental costs to the detriment of food, livelihood and environmental security for communities across the world. Whilst localisation of the food system does not conclusively result in reduced contributions to greenhouse gas emissions, it tends to promote greater sustainability through the building of community networks and embeddedness that increase the potential for strengthening community resilience, accountability and the internalisation of social and environmental costs. Challenges in the near future of population growth, urbanisation, climate change, intensifying environmental degradation and peak oil are expected to drastically alter the ways in which we are able to produce and distribute food. Local food economies are presented as an alternative food system that builds social, economic and environmental capital at a community level whilst increasing community resilience to future shocks and threats.

Research into the current status of production, distribution and consumption for Stellenbosch found that the region currently produces predominantly wine grapes and other deciduous fruit for export, whilst relying on imported food produce from other regions for consumption. High levels of food insecurity are recorded for areas within Stellenbosch and findings are presented on the food requirements for a nutritionally optimal diet for the region. Productive potential of the land and urban zones are translated into potential yield and compared with current and nutritionally optimal food demand. The findings suggest that Stellenbosch has the potential to produce enough food to meet all local requirements (both current and nutritionally optimal) but this would require drastic shifts in land use. A discussion is presented on optimal land use, comparing production of wine grapes for export with food production for local consumption.

The conclusions drawn from the thesis suggest that in the context of current food, livelihood and environmental insecurity and future vulnerability as a result of increasing demand, climate change and peak oil, local food economies have a vital role to play in promoting sustainability. Stellenbosch is currently vulnerable with a high dependency on export markets for local produce and imported produce for local consumption. Building a stronger local food economy in Stellenbosch has the potential to create opportunities to address challenges of poverty and inequality, build resilience and promote environmental sustainability.

The recommendations of the thesis are to boost local production of key food crops suitable to the region, actively invest in the strengthening of local distribution networks that connect local producers more directly to local consumers and to build a local food movement with consumers through education and awareness. Several opportunities for further scholarship are presented.

Opsomming

Die hoofdoel van hierdie tesis is om voedselekonomieë as 'n instrument van volhoubaarheid aan te moedig. Spesifiek gekose literatuur en 'n ondersoek na die huidige voedselproduksiesituasie, verspreiding en die verbruik van voedsel in Stellenbosch is gebruik om voorstelle te maak vir verhoogde volhoubaarheid in die toekoms deur die gebruik van die voedselsisteem in Stellenbosch.

Uit die literatuurstudie is gevind dat moderne voedselsisteme neig na die eksternalisasie van sosiale- en omgewingskostes en dus die sekuriteit van voedsel, lewensonderhoud en 'n gesonde omgewing vir gemeenskappe reg oor die wereld bedreig. Die lokalisering van voedselsisteme beteken nie noodwendig dat die vrystelling van uitlaatgasse wat tot aardverwarming bydra verminder word nie, maar dit dra wel by tot volhoubaarheid deur gemeenskapsnetwerke en gemeenskapsbande te versterk. Sterker gemeenskappe dra verder by tot meer veerkragtige herstel en moedig aanspreeklikheid en die internalisasie van sosiale- en omgewingskostes aan. Uitdagings in die nabye toekoms, soos populasiegroei, verstedeliking, klimaatsverandering, die intensifisering van omgewingsdegradering en die olie-piek, gaan die manier hoe voedsel geproduseer en versprei word drasties verander. Plaaslike voedselekonomieë word dus as 'n alternatiewe voedselsisteem voorgestel, omdat dit sosiale-, ekonomiese- en omgewingskapitaal opbou op gemeenskapsvlak en dit 'n meer veerkragte herstelvermoë gee om effektief te reageer op toekomstige skokke en bedreigings.

Navorsing oor die huidige produksie, verspreiding en gebruik van voedsel in Stellenbosch het bevind dat die streek hoofsaaklik wyndruiwe en ander sagte vrugte produseer vir die uitvoermark, terwyl dit op invoere staatmaak vir plaaslike gebruik. Hoë vlakke van voedselonsekerheid in areas in en om Stellenbosch is aangeteken en die bevindinge word aangebied in terme van die optimale voedsame dieet vir die omgewing. Die potensiaal vir die produktiwiteit van landelike en stedelik gebiede in Stellenbosch word vertaal as die potensiële oes en word vergelyk met huidige en die optimale voedsame voedsel aanvraag. Daar is in die navorsing bevind dat Stellenbosch die potensiaal het om genoeg voedsel te produseer om in alle plaaslike vereistes (beide huidiglik en optimaal voedsaam) te voldoen, met 'n drastiese verandering in grondgebruik. Voorstelle word

gemaak oor die optimale gebruik van grond deur die produksie van wyndruiwe vir uitvoer te vergelyk met voedselproduksie vir plaaslike gebruik.

Die gevolgtrekkings dui daarop dat die huidige voedsel-, lewensonderhoud- en omgewingsonsekerheid, tesame met 'n toekomstige kwesbaarheid as gevolg van verhoogde aanvraag, klimaatsverandering en die olie-piek, beteken dat plaaslike ekonomieë 'n belangrike rol gaan speel in volhoubaarheid. Stellenbosch is tans kwesbaar omdat dit staatmaak op uitvoer van plaaslike produkte en op ingevoerde produkte vir plaaslike gebruik. Deur 'n sterker plaaslike voedselsisteem te bou, kan Stellenbosch geleenthede skep om armoede en ongelykheid aan te spreek, 'n veerkragtige herstelvermoë te bou en omgewingsvolhoubaarheid aan te moedig.

Die voorstelle in hierdie tesis sluit in om plaaslike produksie van sleutel voedselgewasse wat volhoubaar is te verhoog, om aktief te bele in die versterking van plaaslike verspreidingsnetwerke wat plaaslike produseerders en gebruikers direk verbind en om 'n plaaslike voedselbeweging daar te stel deur gepaste opvoeding en bewusmaking. Verskeie geleenthede bestaan vir verdere navorsing.

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List of Acronyms and Abbreviations

CSA	Community Supported Agriculture
CWDM	Cape Winelands District Municipality
FAO	Food and Agriculture Organisation
GIS	Geographic Information System
GM	Genetically Modified
HEI	High External Input
IAASTD	International Assessment of Agricultural Knowledge, Science & Technology for Development
IDP	Integrated Development Plan
IEA	International Energy Agency
ILO	International Labour Organisation
IMF	International Monetary Fund
IPCC	International Panel on Climate Change
ITUC	International Trade Union Confederation
MA	Millennium Ecosystem Assessment
NGO	Non-governmental Organisation
SAP	Structural Adjustment Programme
SDA	Secondary Data Analysis
SIWI	Stockholm International Water Institute
SMA	Stellenbosch Municipal Area

TNC	Transnational Corporation
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFPA	United Nations Population Fund
UN-HABITAT	United Nations Human Settlement Programme
WCED	World Commission on Environment and Development
WCPG	Western Cape Provincial Government
WHO	World Health Organisation
WTO	World Trade Organisation
WWF	World Wildlife Fund

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Chapter One: Introduction

Only after the last tree has been cut down,

Only after the last river has been poisoned,

Only after the last fish has been caught,

Only then will you find that money cannot be eaten.

Cree Indian Prophecy

1.1 Background and motivation

Globally, food riots from Haiti to Mozambique in early 2008 brought to international attention the increasing price of basic food produce and the alarming global food crisis[1] which is directly affecting the lives of millions of people around the world and serving as an immediate impediment to human development (FAO, 2008:02). Whilst market forces have largely been blamed for recent events (FAO, 2008:09), much deeper and more complex concerns lie beneath the surface of food insecurity that arise from the manner in which the modern food system functions, including the externalisation of social and environmental costs through the commoditisation of food (Pretty, 2002:52; Patel, 2007).

The global agricultural system is currently producing enough food to meet the world's demand (FAO, 2002:09) whilst over 900 million people remain malnourished (FAO, 2008:02) indicating the need for a more equitable system of distribution globally. Growth in agricultural productivity is flattening (Bourne, 2009:51; UNEP, 2009:16), signalling a system in crisis as demand continues to grow[2] (Scherr, 1999:31) in the context of growing constraints on food production[3] (IAASTD, 2009:5). These challenges will only be further compounded by the effects of climate change (both

[1] By mid-2008, real food prices were 64 percent above 2002 levels with the only similar price hikes being experienced in the early 1970s with the first international oil crisis, resulting in widespread famine and riots (FAO, 2008:09).

[2] Global demand for cereals will increase by 41 percent between 1992 and 2020, with 80 percent of this increased demand originating from developing countries (Scherr, 1999:31).

[3] The IAASTD Report recognises "current terms of trade and policies, and growing water and land scarcity, coupled with projected changes in climate" as major constraints on food production (IAASTD, 2009:05).

as a result of the modern food system and having severe impacts on food production), (IPCC, 2007:05, 11) and the end of cheap oil on which we have come to depend (Campbell, 2002; IEA, 2008). Growing corporate control over the global food system has resulted in food being valued as a commodity and not as a fundamental human right (Norberg-Hodge, Merrifield & Gorelick, 2002; Patel, 2007; Pimbert, 2008) produced within the context of a planet with a limited carrying capacity (McMichael, Bolin, Costanza & Daily, 1999:205, McNeely & Scherr, 2001:02; WWF, 2008:01-03). In essence, we have lost our connection to the food systems sustaining life (Pretty, 2002:xii) and thereby have lost control over determining our own food, livelihood and environmental security (Shiva, 1995; Norberg-Hodge, Merrifield & Gorelick, 2002:05-06; Via Campesina, 2008).

Building local food economies (defined under Section 1.3, iii) has been proposed as having a role to play in addressing some of the negative effects of the modern food system, and promoting more sustainable, equitable, resilient and empowered local communities (Feenstra, 1997; Shuman, 1997; McKibben, 2007). This research aims to assess the extent to which local food economies can promote sustainability through a review of theoretical discussions and practical experiences.

The research area has been defined as the Stellenbosch Municipal Area (SMA) (hereafter referred to as 'Stellenbosch'), in the Western Cape Province of the Republic of South Africa. Stellenbosch presents an interesting and noteworthy case study for the research. Covering 831 square kilometres and with a current estimated population of 208 950 (Stellenbosch Municipality, 2009:03), Stellenbosch is a system small enough to be studied critically yet large enough to reflect the complexities of human settlements. The region is comprised of a diverse and representative mix of ethnic groups and settlements types (from dense urban to remote rural), contributing to the unique character of Stellenbosch. Whilst Stellenbosch is historically rich in natural beauty and resources, it also faces many challenges, including a legacy of inequality and increasing resource-based limitations. Stellenbosch is currently experiencing multiple challenges of growing pressure on biodiversity, waste, water, energy and food security (Stellenbosch Municipality, 2008:33-37). Great wealth continues to exist alongside severe poverty and unemployment (Stellenbosch Municipality, 2009:05). An overview of Stellenbosch is provided in further detail in Chapter Four, Section 4.2.

Stellenbosch mirrors many of the challenges being faced on an international scale, including the challenge of how to overcome the current environmental, social and economic polycrises on the path towards sustainable development. The strong institutional support and commitment to sustainable development (detailed further in Chapter Four), in combination with the wealth of knowledge and resources Stellenbosch is renowned for, contributes to a fertile environment for the recommendations of solution orientated research to be applied. The challenges facing

Stellenbosch present an exciting opportunity for building an alternative path to development, founded on environmental sustainability and social equality. As both my place of birth and residence, I also have a personal interest in and understanding of the region.

My interest in the research topic is set in the context of an increasing personal awareness, both theoretically and practically, that our global system is in crisis and that the challenges facing our generation are both deeply connected and highly complex. My academic background in sustainable development has grounded my understanding of the world not in the conventional measures of progress through economic growth but rather with an appreciation for the need for an embedded approach that places value on society and ecology as drivers of development (Bartelmus, 1994; Mebratu, 1998; Swilling, 2008; Harding, 2009).

Encounters with communities both locally and abroad have given me firsthand experience of the warning signs of a global system in degradation and crisis (including extreme poverty, rising food prices and poor nutrition coupled with soil degradation, fossil fuel dependency and vulnerability to climate change). I have increasingly begun to consider how these challenges are related to, and impact on, our systems of food production, distribution and consumption (hereafter referred to as 'food systems'). Through my professional work on land reform and food security in Stellenbosch, I have become aware of the extent to which food systems affect both the livelihoods and food security of local individuals, families and communities.

I have been inspired firsthand by communities (from *Gut Rheinau*, the largest biodynamic farm in Switzerland to *Al Kharm*, a small tribe of Bedouin in the Sinai, Egypt) practicing alternative systems of agriculture that are productive, fair and environmentally appropriate. The case study of Cuba[4] has led me to consider deeply an alternative paradigm for agriculture, and the role of localisation (producing agricultural produce locally for local consumption) within that (Funes *et al.*, 2002).

Learning about various forms of localisation, I was interested to explore what a sustainable local food system might look like for my home town of Stellenbosch. Before I was able to investigate the potential for promoting greater sustainability through Stellenbosch's food system, it became evident that it would be necessary to build an understanding of the current food system. As a region in need of a more holistic approach to food production and distribution that places greater value on communities and the natural environment, how could Stellenbosch craft an alternative system that promotes sustainability, and to what extent should this be inclusive of localisation? Through the literature, I have also come across opposition to the claims that local food economies promote greater sustainability which have generated equal interest (Winter, 2003:23; Born & Purcell, 2006:195).

[4] The case study of Cuba is presented in further detail in Box 1: The Cuban Experience.

My motivation is to investigate the benefits and limitations of local food economies in promoting sustainability by moving beyond the debate of local food miles and the perception of upmarket Saturday farmers' markets to unpack the real functioning of a local food economy and identify opportunities for promoting both livelihood security for farmers and food security for consumers across all income brackets. My research objective has developed into assessing the extent to which localisation can play a role in contributing to more equitable, sustainable and resilient communities. The research aims to provide recommendations for a suitable response for the current food system of Stellenbosch to the pressing challenges of sustainable development.

1.2 Research objectives

The objectives of the research are to investigate the benefits and limitations of local food economies in promoting sustainability, to build an understanding of the current status of local food production, distribution and consumption in Stellenbosch in order to identify opportunities and challenges for promoting greater sustainability through Stellenbosch's food system and, based on the research conducted, to recommend measures which can be taken to promote greater sustainability through Stellenbosch's food system.

Research questions

The research objectives can be clearly defined as the following set of research questions:

i. From a review of the literature, what are the benefits and limitations of local food economies in promoting sustainability?
ii. What is the current status of local food production, distribution and consumption in Stellenbosch?
iii. What recommendations can be made to promote greater sustainability through Stellenbosch's food system?

1.3 Clarification of concepts

The following key concepts are used in this research paper and are defined here for clarity:

i. *Local foodshed*: the immediate geographic region capable of producing food to supply the local population (adapted from Peters, Bills, Wilkins & Fick, 2008:02; Sonntag, 2008:06). Local refers to immediate geographic region, but the boundaries identified by different communities can vary significantly (such as from within a 100 mile radius or an entire nation state). For the purposes of this study, this refers to the geographic region within the borders of the Stellenbosch Municipal Area (Refer to Figure 12).

ii. *Local food system*: is one that promotes fundamental securities (including food, livelihood and environmental security) through a local or community based approach. *Localisation* in this context therefore refers to a transition towards a local food system.

iii. *Local food economies*: the flow of resources within a network of community-based enterprises involved in the production and distribution of food at the local scale for the purposes of local consumption including, but not limited to, financial, human, social and environmental capital. Local food economies refer to local food initiatives at a community level within the context of a predominantly modern food system globally.

iv. *Sustainable development (and sustainability):* improvement in the quality of life for all humans equitably, both intra and inter- generationally, within the context of the earth's limited carrying capacity (adapted from WCED, 1987; Mebratu, 1998; Gallopin, 2003). The literature review in Chapter Two, Section 2.2 provides a theoretical foundation for this definition.

v. *Food security*: exists when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life (World Food Summit, 1996).

vi. *Livelihood security*: "a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the long and short term" (Chambers and Conway, 1992:07-08).

1.4 Significance of the study

In the context of current threats to food, livelihood and environmental security as well as future challenges of increasing demand, climate change and peak oil, this study bears significance for its value to investigate viable alternative food systems. The research, in its objectives to investigate the benefits and limitations of local food economies to promote sustainability, contributes to the current research context of sustainable development and specifically, food and livelihood security. The research aims to move beyond the traditional food miles debate which dominates popular literature to investigate local food economies, with an emphasis on sustainability through social equality, ecological integrity and community resilience. Furthermore, the research will document local food movements in Stellenbosch that have not been formally documented.

On a practical level, the research brings together data sets that have not previously been correlated, analyses the current food economy of Stellenbosch which has not previously been studied in this way and identifies opportunities for further scholarship. The recommendations made based on this research will further support current food security initiatives and land reform

programmes for agricultural production and distribution within Stellenbosch. I am optimistic that the research outcomes will be transferrable and of value to other regions as well.

1.5 Overview of research design and methodology

The research methodology was designed to meet the research objectives as outlined in Section 1.2 and incorporated both quantitative and qualitative approaches, as well as a combination of research techniques. The research drew on both non-empirical research (comprehensive literature review) and empirical research (data collection, formal and informal interviews). Chapter Three provides a detailed description of research design (Section 3.2) and research process and methodology (Section 3.3), summarised below.

The first objective of the research was to investigate the benefits and limitations of local food economies in promoting sustainability. A comprehensive literature review was undertaken to provide a sound theoretical understanding of sustainable development and the modern food system as a lens through which to assess the benefits and limitations associated with promoting sustainability through local food economies. The theoretical approach was informed by a systems thinking perspective (Clayton and Radcliffe, 1996:01-27; Gallopin, 2003:07), recognising the importance of an embedded understanding of sustainability that realises development through both society and ecology, and especially by an understanding of complexity which places strength in diversity and non-vertical systems of organisation (Cilliers, 2000a:10-12; 2000b:24-27; nd:02-09; Harding, 2009:35). The outcomes of the literature review were used to inform the approach taken for the research in meeting the second research objective (outlined in Chapters Three and Four) and as the foundation for informing the recommendations (based on the research conducted) for Stellenbosch in the final part of the research (Chapter Five).

The next objective of the research was to build an understanding of the current status of food production, distribution and consumption trends in Stellenbosch in order to formulate recommendations to promote sustainability through Stellenbosch's food system (and meet the final research objective). This would require being able to compare current production with current consumption in order to establish whether Stellenbosch had the capacity to localise it's food system and meet local consumption demands through local production (i.e., what is currently being produced). This was further compared with nutritionally optimal consumption[5] based on high levels of food insecurity that were recorded for the region (Khoza, Troskie and Jacobs, 2009:102; van Niekerk, 2009). The final aspect was then to compare current and nutritionally optimal consumption

[5] Nutritionally optimal consumption refers to the consumption demands for the region that would promote optimal nutrition and described further in Section **Error! Reference source not found.**.

with potential productive capacity (i.e., what could be produced) in order to inform the recommendations presented in support of the final research objective.

The research design included sourcing empirical data from a variety of surveys, census data, published research and market information (secondary data analysis) as well as interviews with various stakeholders in the food production, distribution and consumption sectors for the Stellenbosch region to build an understanding of the status of Stellenbosch's food system. The research drew on ongoing discussions (both formal and informal) with local farmers, local retailers (from community supported agriculture (CSA) programmes, local markets and commercial retailers) and the local municipality given their direct role in the research topic area. Discussions were also conducted with individuals involved in local food initiatives in order to better understand the benefits and limitations of local food economy experiences in the reality of the Stellenbosch context. Several limitations were experienced with insufficient data availability, which are detailed in Chapter Three, Sections 3.3 and 3.4, and opportunities for further scholarship were identified (Chapter Five, Section 5.4). The aim of the research was to establish current practices, challenges and opportunities for promoting localisation of the food economy in Stellenbosch, given the value of local food economies in promoting sustainability as established in Chapter Two through the first research objective.

The final objective of the research was to provide recommendations for promoting sustainability through Stellenbosch's food system. The recommendations made (presented in Chapter Five, Section 5.3) are based on the outcomes of the literature review, the data collected and interviews conducted as well as personal observations both during and prior to the research period. Opportunities for building a stronger local food economy are identified that can play a role in facilitating a transition towards greater sustainability for Stellenbosch in a manner which not only serves a select few residents today, but supports the wider community in the long term through a diversity of locally appropriate programmes.

1.6 Thesis outline

A thesis outline is provided in

Figure 1 and described below. Chapter One provides an introduction to the research, including motivation for study, outline of research objectives and approaches, clarification of terminology and significance of the research.

A comprehensive literature review is presented in Chapter Two and provides an overview of the current global polycrisis and establishes a definition for sustainable development. The modern food system is reviewed and provides a context for identifying emerging responses, including the local

food movement. The origins of the local food movement are explored and core characteristics described. Based on the definition of sustainability that has been built and in the context of the impacts of the dominant modern food system, the benefits and limitations of local food economies in promoting sustainability are discussed. Conclusions are drawn on the value of local food economies in promoting sustainability in support of the first research objective.

Chapter Three outlines in detail the research design and methodology, including motivation for the theoretical framework and justifications for the practical measures taken to meet the research objectives.

Research findings and analysis are presented in Chapter Four, including an introduction to Stellenbosch and an overview of current production, distribution and consumption patterns for the region in support of the second research objective. Research findings are presented on nutritionally optimal consumption demands, potential productive capacity and suggested land use as the foundation for making recommendations in Chapter Five. Case studies are presented that highlight existing initiatives to promote a sustainable food system in the local context.

The final chapter, Chapter Five, concludes the main findings of the research, presents a series of recommendations in support of the final research objective and identifies opportunities for further scholarship.

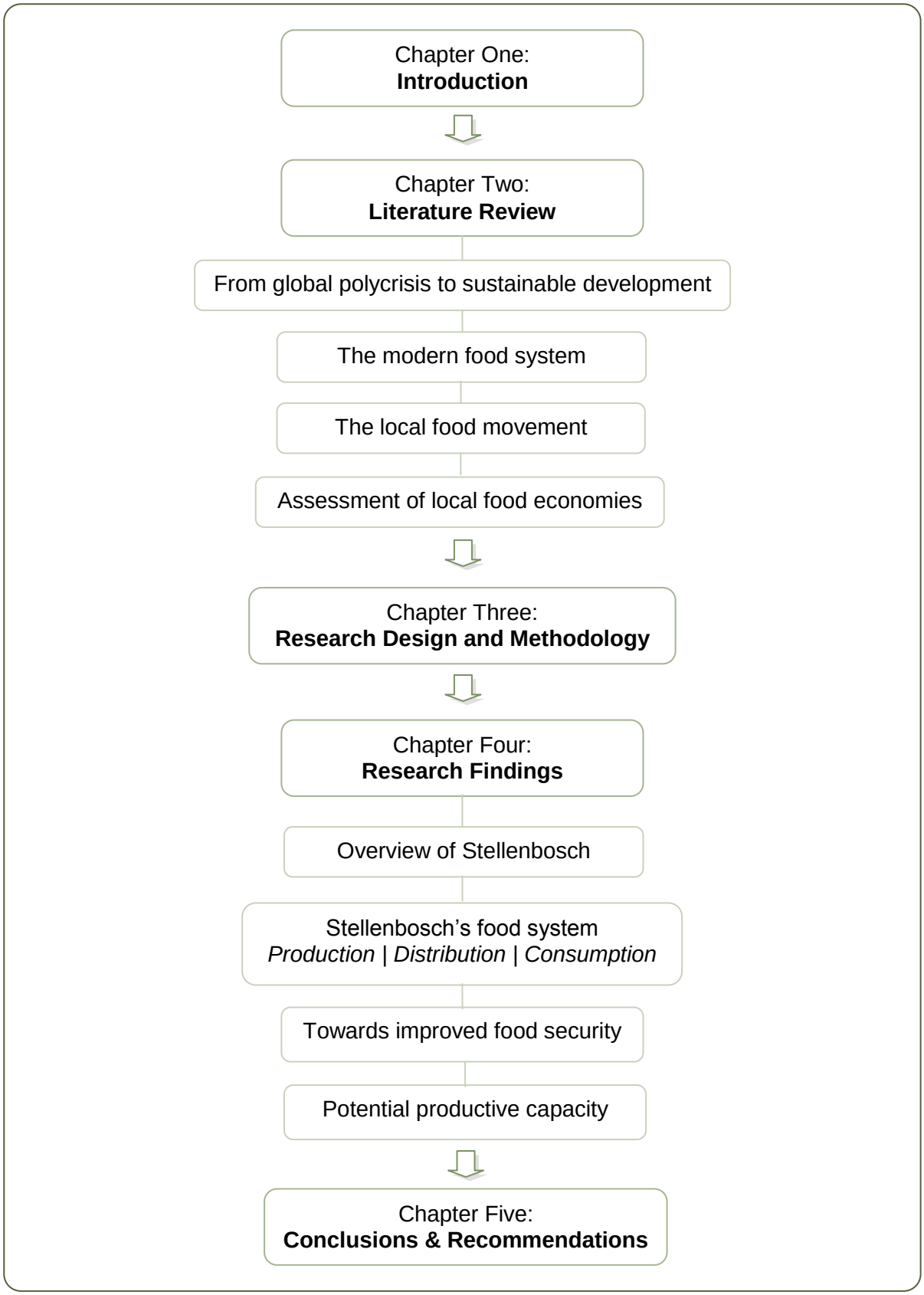
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Figure 1: Thesis outline

Chapter Two: Literature Review

2.1 Introduction

The literature review aims to investigate the benefits and limitations of local food economies in promoting sustainability. The research design and methodology for the literature review are presented in Chapter Three, Section 3.3.1. A theoretical framework for this investigation is built by providing the context for the need for sustainability through a review of the current global polycrisis (including both current and future challenges for our global society) that would then enable the development of a sound definition of sustainable development and sustainability (Section 2.2). A review of the functioning and impacts of the modern food system (Section 2.3) provides the context for emerging alternative food movements, including the local food movement (Section 2.4). The local food movement is traced from origin to current functioning and core characteristics (Section 2.5). This theoretical framework provides a foundation from which to assess the benefits and limitations of local food economies to promote sustainability as has been defined (Section 2.5).

2.2 From global polycrisis to sustainable development

From the recent economic crisis to shifting global climates, there are multiple alarms being raised signalling that our planet is a system in crisis. This state of *global polycrisis* "consists of a multiple set of nested crises that tend to reinforce one another" (Swilling, 2009) and that are not reducible to singular cause and effect relationships. A review of several key international reports (in Sections 2.2.1 - 2.2.4) will highlight how these challenges are deeply connected and serve as an impediment to both current and future development[6]. An argument will be presented that our global society cannot afford a path of development that operates without limits, but rather that development can only take place through both environmental and social sustainability. This will provide a theoretical framework for building a definition of sustainability that moves beyond the broadness of the commonly accepted Brundtland Report (1987) definition of sustainable development[7] and to frame the analysis within the context of the current sustainability discourse.

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[6] Human development is defined as "a process of enlarging people's choices, achieved by expanding human capabilities, and functionings ... for people to lead long and healthy lives, to be knowledgeable and to have access to resources needed for a decent standard of living" (UNDP, 1998:14) and is explained further under Section 2.2.5.

[7] The Brundtland Report defined sustainability as "development which meets the needs of the present without sacrificing the ability of future generations to meet their needs" (WCED, 1987).

2.2.1 Poverty, inequality & the economic crisis

Global inequality accounts for the poor distribution of resources necessary for development and undermines the potential for social organisation (Meth, 2007), thereby entrenching poverty further. Bartelmus (1994:06) recognised that our challenges are not of "absolute physical shortage but of economic and social maldistribution and maluse". A key finding of the Human Development Report in 1998 was that the richest 20 percent of the world account for 86 percent of total private consumption expenditure, whilst the poorest 20 percent account for 1.3 percent (UNDP, 1998:02) and despite commitments to poverty reduction, the number of people living in poverty has in fact increased whilst total world income continues to rise (Stiglitz, 2002:04-06).

"There is growing realisation that economic growth does not necessarily go hand-in-hand with growth in the well-being of people. Standard measures of economic output such as Gross National Product do not reflect the growing disparity between rich and poor in most nations (UNDP, 1996a), or the environmental degradation which diminishes the health of people, communities, ecosystems, and the economy (Daly and Cobb, 1989)" (Ayres *et al*., 1996:02). Poverty must therefore be defined not only as income-based, but as multiple barriers of access to opportunities which would empower individuals to improve their quality of life. This includes access to employment, but also access to basic services, education, healthcare or a clean living environment (Lok-Dessalien, nd). Understanding and reducing poverty in order to allow opportunity for improvement in quality of life will require a much deeper awareness which overcomes the shortcomings of an economic growth agenda for development.

Whilst economic growth does not necessarily equate to improved quality of life, economic crises carry significant negative costs. The recent global economic crisis is directly impacting on the lives of the poorest and most vulnerable as unemployment soars[8] and the cost of living continues to rise[9]. Whilst the economic crisis is highly complex and the causes hotly debated, there is a growing consensus that linear economies founded on unsustainable consumerism will exacerbate suffering, especially for the most vulnerable, through further environmental degradation and rising living costs as resources are continuously diminished (Bartelmus, 1994). As identified by Swilling (2008), "costs of unsustainable resource use are rising, but get displaced from one group to another (in particular the poor) and to future generations". Any movement intending to promote development must take into account a more holistic understanding of both poverty and inequality. This is one of the key challenges to sustainable development which must be addressed.

[8] Unemployment is expected to rise by between 18 and 51 million people above 2007 levels by the end of 2009 (ILO, 2009:05).

[9] The recent food crisis resulted in food prices rising by up to 60 percent in the first six months 2008 (FAO, 2008:09) and resulted in an estimated further 150 million people being pushed into hunger (ITUC, 2009:09).

2.2.2 Reaching environmental thresholds

From species extinction to ecosystem destruction, patterns of human consumption are resulting in significant environmental degradation which will impact directly on the quality of and potential for human life. The Millennium Ecosystem Assessment (2005), a global study on the state of the world's ecosystems, found that over 60 percent of the planet's key ecosystem services (that we depend directly on for life supporting services) are severely degraded, that the rate of degradation over the past fifty years is unprecedented and is expected to increase over the next fifty years (MA, 2005:01).

The assessment issues a stern warning that, whilst reversing ecosystem degradation and meeting the needs of future generations may be possible, it will require a drastic shift in the trajectory of current development (MA, 2005:01). Furthermore, several critical resources that the human population relies on for life (such as energy, water, soil and minerals) are being depleted at unsustainable rates (Scherr, 1991; Pearce, 2006; MA, 2005; IEA, 2008; WWF, 2008).

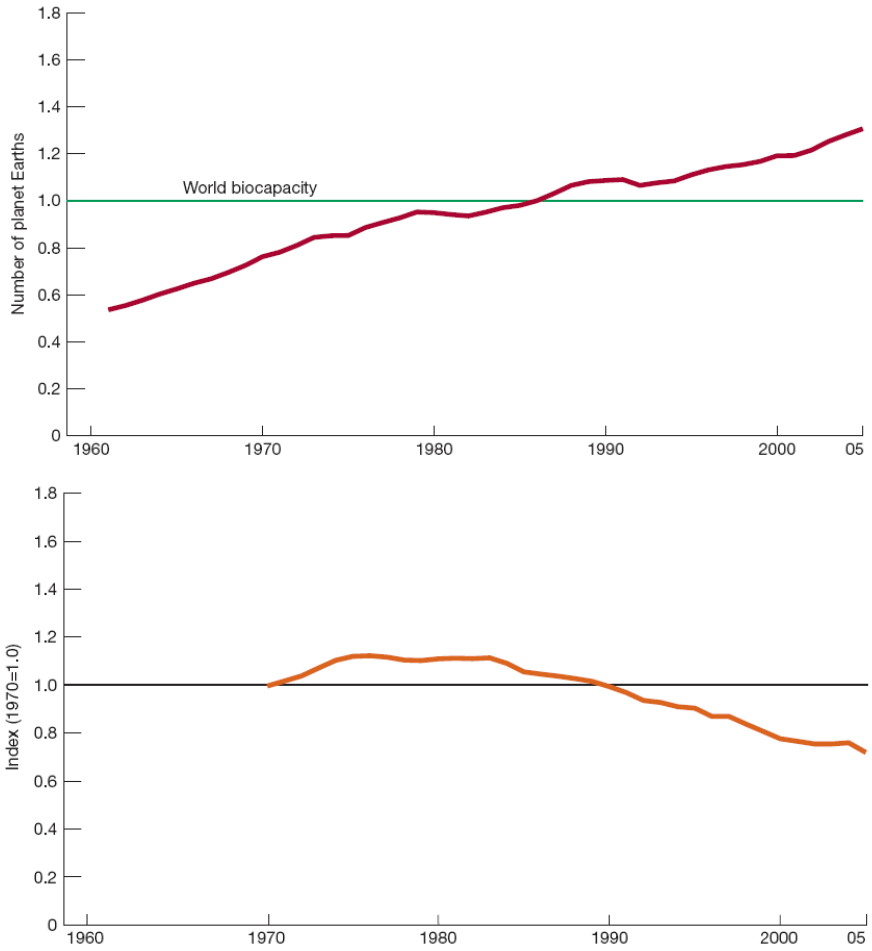


Figure 2: (a) Living Planet Index, 1970–2005; (b) Humanity's Ecological Footprint, 1961–2005

Source: WWF, 2008:02

Referring to Figure 2 (above) the *Living Planet Index* measures trends in the Earth's biological diversity by globally tracking the populations of over 1 300 vertebrate species (for which trends in populations are typical of overall biodiversity) and thereby tracking the health of ecosystems that these wild species depend on. *Humanity's Ecological Footprint* is a measure of human impact on biologically productive land and water that provides life supporting ecosystem resources and services. The Earth's *biocapacity* is also indicated in Figure 2 above and refers to the amount of biologically productive area available to meet humanity's needs. Our global Ecological Footprint has exceeded the planet's biocapacity by roughly 25 percent since the late 1980s and the Living Planet Index has fallen by approximately 30 percent since 1970 (WWF, 2008:02). The capacity of the planet to regenerate is unable to match growing demand on the planet's resources and services. In essence, "humanity is no longer living off nature's interest, but drawing down its capital" (WWF, 2009).

The planet has limited capacity to act indefinitely as both a sink and a source for human development and reaching such planetary thresholds will affect the human population as a whole, but impact disproportionately on the world's poor[10]. As recognised by Swilling (2007:04), "thresholds are now being reached which if ignored will generate dysfunctional economic costs that will undermine investments in growth and poverty eradication".

Whether we have crossed over the tipping point or not, the extent to which it is reversible, and the state of such a planet if such restoration is even possible, are highly debatable topics. What is certain is that we are in a dangerous period where demand on the natural environment may be greater than supply (refer to Figure 2 above), distribution is certainly not fair and our future on such a trajectory is most definitely unstable. In this context, it is critically important for systems of production that humans depend on and which rely on the natural environment (such as the food system), to operate within the context of the earth's limited carrying capacity.

2.2.3 Climate change and peak oil

Globally, we are already experiencing the impacts of climate change[11] and these are predicted to intensify in the near future. Climate change is a direct result of green house gas emissions increasing in concentration (by over 70 percent in the last three decades), that can be attributed to the unsustainable nature of our global economy (IPCC, 2007). Global warming will result in a minimum of 2 degrees warming globally and will affect local weather systems erratically and

[10] 1.4 billion people are located in ecologically sensitive regions, concentrated in the developing world and predominantly rural poor (Altieri, 2002a:02)

[11] "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases" (IPCC, 2007:02).

intensely, resulting in increased pressure on basic resources and severely compromising livelihood security (IPCC, 2007:05-08). Furthermore, sea level rise associated with climate change will severely impact on densely populated coastal zones (IPCC, 2007:08). The Stern Review commissioned by the British government clearly outlines that, with the impacts of climate change, it is again the world's poorest and most vulnerable who have contributed least to the global crises being experienced but who will suffer first and most severely (Stern, 2006:vii). The review further highlights the importance of taking measures in the short term in order to avoid excessive mitigation costs in the long term (Stern, 2006:i).

Furthermore, strong evidence is being presented that peak oil[12] has already been reached and that the remaining oil reserves will be increasingly more costly to reach (Edwards, 1997:1292; Bentley, 2002:189; Campbell, 2002). Whilst demand for oil is still increasing[13], the limited capacity of the remaining reserves will result in sharp and continuous price increases for fossil fuels and their multitude of derived products. As recognised by the most recent publication of the World Energy Outlook by the International Energy Agency, "it is becoming increasingly apparent that the era of cheap oil is over" (IEA, 2008:14). This has serious implications on our global economy (which has been built on and grown through a frightening dependence on cheap fossil fuels), as well as the quality of life of the world's population largely dependent on the global economy for the allocation of resources (Bentley, 2002:204; Hallock, Tharakan, Hall, Jefferson & Wu, 2004:1673; Campbell, 2009b). In this context, development strategies should therefore reduce green house gas emissions and prepare for the impact of climate change whilst reducing dependency on fossil fuels in anticipation of a low carbon future.

2.2.4 Population growth and urbanisation

Urban citizens already make up over half of the world's population and as the world's population surges from over 6 billion today to an estimated 9.2 billion by 2050 (UN DESA, 2008:01), most of this growth will take place in the cities of the developing world (UNFPA, 2007:01). Africa and Asia are the fastest growing regions with urban populations expected to double between 2000 and 2030 (UNFPA, 2007:01).

These waves of urbanisation in the developing world will result in the expansion and growth of cities at a scale that will dwarf the current challenges to realising development being faced by these cities. Currently one third of the world's population live in cities of the developing world, where poverty is increasingly concentrated (UN-HABITAT, 2003:01) and most of the urban growth is expected to take place (UNFPA, 2007:01). As urban growth explodes in the cities of the

[12] "The term Peak Oil refers to the maximum rate of the production of oil in any area under consideration, recognising that it is a finite natural resource, subject to depletion" (Campbell, 2009a).
[13] Demand for oil is expected to increase by a further 45 percent by 2030 (IEA, 2008:04).

developing world, increasing strain will be placed on the limited environmental resources and services of the planet. Development strategies will have to plan not only for current demand, but also the growing demand of an increasingly crowded planet.

2.2.5 Towards sustainable development

> *"Our bulging population and voracious use of the earth's resources are leading to unprecedented multiple environmental crises. Never before has the magnitude of human economic activity been large enough to change fundamental natural processes at the global scale, including the climate itself. Humanity has also filled the world's ecological niches; there is no place to run." (Sachs, 2008:25)*

The concise summary of the current global polycrisis as provided by Sachs (above) must be set in the context of future crises that are already unfolding and which will serve to intensify the challenges to development going forward. The underlying causes of the economic crisis (externalisation of social and environmental costs resulting in unstable markets and deepening poverty) will continue to be felt in the future as environmental thresholds are increasingly reached and the effects of climate change intensify. The end of cheap oil will drastically alter the nature of our global society – a global society that is expected to explode through urban growth in the developing world in the immediate future. The current and future global polycrisis is a deeply connected and highly complex challenge that is ultimately serving to deeper entrench poverty and inequality. It also presents a unique opportunity to forge an alternative approach to development.

Whilst the term *sustainable development* may have been coined in recent decades, the concept is not new. We learn from history of the rise and fall of great civilisations, which have been closely linked to environmental factors (Mebratu, 1998; Diamond, 2005). From Buddhism to Sufism, ancient teachings have emphasised the importance of harmony and balance with our living planet (Macy & Young-Brown, 1998). However, "during the past two centuries, and especially during the last five decades, the global economy has shown incredible growth, transforming the character of the planet and especially of human life" (Mebratu, 1998:496). This also brings with it the potential for catastrophe far greater than before, especially when such growth is seen as independent of the eco-systems they are drawing from, and upon which life depends (Ayres *et al.,* 1996; Hawkens *et al.*, 1999).

The founding of the Club of Rome[14] in the early 1970s marked growing recognition that there might be a limit to the planet's providing capacity, whilst literature began to warn of looming

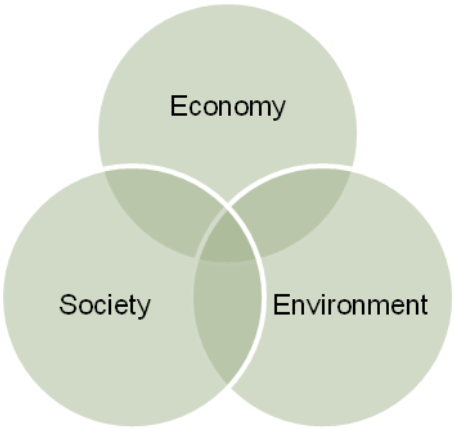
[14] The Club of Rome is a not-for-profit organisation, independent of any political, ideological or religious interests. Its essential mission is "to act as a global catalyst for change through the identification and analysis of the crucial problems facing humanity and the communication of such problems to the most important public and private decision makers as well as to the general public" (Club of Rome, 2009).

environmental destruction (Bartelmus, 1994:07). A rise in environmental awareness spurred international debate which resulted in the publication of the Brundtland Report and other key documents, in which the term sustainable development began to take centre-stage (Mebratu, 1998:494). The Brundtland Report defined sustainability as “development which meets the needs of the present without sacrificing the ability of future generations to meet their needs” (WCED, 1987). A key limitation of this definition is its failure to make explicit reference to social equality or environmental limits. Furthermore, stemming from an attempt to gain consensus, its inherent lack of clarity has left the definition open to interpretation and left commitments to sustainability as vague as the definition itself (Pezzoli, 1997; Mebratu, 1998:494; Sachs, 1999; Hattingh, 2001; Sachs, 2002).

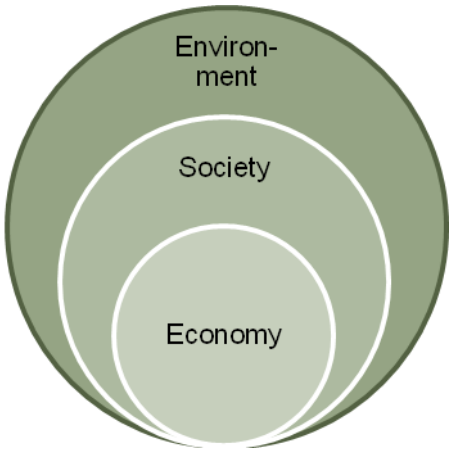
Today, barely a report or policy is published without reference to sustainability and sustainable development, whilst the concepts remain “among the most ambiguous and controversial in literature” (Gallopin, 2003:07). It is not surprising that the terms are interpreted by individuals and organisations so widely and that growth continues to rocket along trajectories which are clearly unsustainable when viewed in the context of the current global polycrisis. The paths of growth and development that we have taken have brought humanity into unchartered waters. Modern society is facing unprecedented challenges of environmental degradation and immense poverty as a result of “growth that does not consider the environmental and social wellbeing of people and the planet”, and which cannot be sustained indefinitely (UNEP, 2007:05).

From an understanding of where we have gone wrong, it is possible to define sustainable development within a new paradigm, placing social equality and improvement in quality of life as priorities firmly within the context of environmental limits. This should be based on principles which recognise that the planet provides humans with the potential for life and that this potential is undermined by human activities that bring about environmental degradation. Improving quality of life will rest on understanding that “human needs, desires and aspirations can be met through a variety of alternative material and non-material satisfiers” and that “development is a qualitative process of realization of potentialities which may or may not involve economic growth (a quantitative increase in wealth)” (Gallopin, 2003:25).

This requires a shift from the conventional understanding of sustainable development as the trade-off between different ‘spheres’ to an understanding that all life takes place within the context of a finite environmental sphere – our living planet. Refer to Figure 3 below.



Conventional Approach



An Embedded Approach

Figure 3: Shifting paradigms

Source: Adapted from Bartelmus, 1994; Mebratu, 1998 and Swilling, 2008

A definition of sustainable development is therefore given as:

> **Sustainable development improves the quality of life for all humans equitably, both intra and inter- generationally, within the context of the earth's limited carrying capacity.**

2.2.6 Section Summary

It is put forward that vagueness of definition can be overcome by defining sustainability in the context of the system being analysed. In order to assess the sustainability of a given system, the following key questions could therefore be asked:

i. *Does it allow for improvement in quality of life for the current generation equitably?* As highlighted in the discussions above about the current global polycrisis, this will need to include addressing challenges of both poverty and inequality linked to the fair and efficient use of resources.
ii. *Does it allow for the improvement in quality of life for future generations equitably?* In the context of growing demand and increasing strain on the planet's carrying capacity as a result of population growth and urbanisation, sustainability should make provision for opportunity to improve quality of life for future generations as well.
iii. *Does it operate within the context of the earth's limited carrying capacity?* Planetary thresholds that are increasingly being reached will need to be respected through more effective management of resources and reduced impact on the natural environment, including reduction in greenhouse gas emissions and reducing dependency on fossil fuels.

The discussion of the global polycrisis gives context to the approaches that would define principles of sustainability for food systems and society at large, as well as a lens through which to discuss the modern food system and emerging local food movements. From this definition of sustainable development and an understanding of the key components that would constitute a sustainable food system, a review of both the modern food system and the emerging local food movement will be undertaken in order to assess the benefits and limitations of local food economies to promote sustainability and meet the first research objective.

2.3 The modern food system

The following review will attempt to unpack the development and key characteristics of the modern food system in order to provide the context for the emerging local food movement and analysing the benefits and limitations of local food economies as an alternative approach (thereby meeting the first research objective as defined in Section 1.2).

2.3.1 The development of the modern food system

This section aims to provide a brief overview of the development of the food system from early plant domestication to the predominantly modern and globalised system which exists today. Key outcomes of the globalisation and modernisation of the food system will be presented.

Plants were first domesticated for agriculture approximately 10 000 years ago in the Fertile Crescent of the Middle East and marked the transition from nomadic lifestyles to that of subsistence farmers and pastoralists (Diamond, 1997:86; Madeley, 2002:10; Trewevas, 2002:670). Subsistence farming and small scale trade was standard practice until the early 1800s when the first waves of colonialism ushered in the beginning of export orientated as well as cash crops in the developing world in order to feed the stomachs of labourers and desires of the upper classes (such as coffee and sugar) fuelling the industrial revolution (Madeley, 2002:13; McMichael, 2006:170; Patel, 2007:85-88). For the first time on a significant scale, food systems became global (Norberg-Hodge, Merrifield & Gorelick, 2002:08).

Both world wars had significant impacts on the food system. Methods of preserving food on a large scale were introduced and the preferences of entire nations have been shaped by marketing promoting products not based on their nutritional content but rather ease of processing (Patel, 2007:88-90,258-260). One of the most significant outcomes of World War Two was the redirection of excess nitrogen by ammunitions manufacturers looking for a new market for their produce that they found in agro-chemical farming (Shiva, 1991:104; McMichael, 2006:176). This signalled the start of chemical intensive (or high external input (HEI) agriculture). HEI agriculture demanded monocropping, which in turn opened up the potential for mechanisation and enabled farms to increase dramatically in size (Gorelick, 2009:05). Important to note is that the modern agricultural

methods not only created a dependency on further chemical inputs but, coupled with mechanisation, modern agricultural methods "increased farm demand for fuel oils, gasoline and electricity, thus increasing agricultural dependence on the energy sector" (McMichael, 2006:176). The new inputs (fertilizers, pesticides, machinery) enabled farms to increase output, and thus profits, but with all the other farms also increasing their outputs, crop prices began to fall (Halweil, 2004:63). This in turn cut into farm profits, which resulted in farm sizes and demand for technology increasing in order to remain competitive. In order to pay off these investments, farmers became trapped into cycles of debt as farm sizes continued to grow (Norberg-Hodge, Merrifield & Gorelick, 2002:07).

The twentieth century was characterised as a period of plant breeding and genetic manipulation for maximisation of traits that would compliment modern agricultural enterprises (Trewevas, 2002:668). This suite of modern agricultural methods was pushed heavily onto the developing world through Structural Adjustment Programmes (SAPs)[15] and those who could afford the modern agricultural package (either on their own or through subsidised financing) made the shift from traditional agricultural methods, often believing the new methods with pesticides and fertilizers would be easier and more productive (Madeley, 2002:13). Many countries embraced modern agriculture and the 'green revolution', of which the extent and impacts were most evident in India (Shiva, 1991), whilst others remained traditional in their agricultural practices. Today, over 40 percent of farms globally have adopted western-style chemically intensive farming methods (Madeley, 2002: 21).

The true globalisation of the food system, the growth of international trade and transnational corporations (TNCs), was achieved in the developing world predominantly through SAPs and other trade liberalisation programmes of international organisations such as the World Bank, International Monetary Fund (IMF) or World Trade Organisation (WTO), (McMichael, 2006:174). These approaches pushed 'modern' development models which were intended to bring about development for the nations of the South. In reality, they have entrenched a new form of colonialism through resource extraction and creating dependency under globalisation (McMichael, 2006:172). This is clearly evident in trade policies which uphold unfair subsidies and trade barriers for developed nations whilst forcing developing nations to withdraw state support for agriculture and trade unprotected on global markets (Via Campesina, 2008:06-08).

The review of the development of the modern food system reveals the extent to which economic agendas prevail over development objectives. The modern food system, premised on modern

[15] SAPs forced developing countries to open markets and focus on crops grown for export rather than internal consumption (Halweil, 2004:51; McMichael, 2006:174).

agricultural methods in the context of globalised trade and its related impacts, is discussed in terms of production, distribution and consumption in Sections 2.3.2 – 2.3.4 below.

2.3.2 Overview of production

> "The way we produce our food can be seen as a litmus test of industrial culture as a whole. The results of that test are quite disturbing." (Norberg-Hodge, Goering & Page, 2001:87)

A brief critique of production that dominates the modern food system is given below through an overview of the impacts of the modern food system on food producers and the supporting natural environment.

Impacts of production on food producers

According to the IAASTD (2008), 40 percent of the world's population derive their livelihoods from agriculture, with a strong concentration in developing nations and specifically Sub-Saharan Africa where approximately 70 percent of employment is generated from agriculture (Refer to Table 1), (IAASTD, 2008:14). It is estimated globally that there are roughly 50 million modern (or commercial) farmers, which is in sharp contrast to the 1.25 billion peasant farmers[16] of the world (Pimbert, 2008:08). Beyond direct employment, agriculture stimulates secondary industries which provide livelihoods for significant numbers of the working population in developing countries, thereby supporting families and communities across the world. It is estimated that 2.5 billion people (men, women and children), depend on agriculture for livelihood security (UNEP, 2008:03).

Table 1: Number of farmers worldwide (billion)

	Total Population	Active Population	Active Farming Population
World	6.1	2.6	1.35
North	1.2	0.4	0.045 (11 percent of active population in North)
South	4.9	2.2	1.29 (59 percent of active population in South)

Source: Charvet, 2005 in Pimbert, 2008:08

Given the critical role that the food system plays in supporting livelihoods, it is important to consider the extent to which livelihood security[17] is promoted through the modern food system. Livelihood security also plays an important role in ensuring that households can afford access to food and is linked to issues of food security as well (Hendriks, 2005 in Khoza, Troskie and Jacobs, 2009:101).

[16] Peasant farmers refer to non-commercial or small-scale farmers.
[17] Defined in Chapter One, Section 1.3.

Governments of developing nations have been forced to reduce investment in both food production and support for small-scale farmers under programmes of the World Bank and IMF, which considered these investments too costly to be supported and argued that farmers needed to become competitive in global markets. This resulted in small and medium scale farmers not being able to access affordable credit and services previously provided by the government (Pimbert, 2008:20) and rendered them unable to compete with international trade and large transnational TNCs (Deumling, Wackernagel & Monfreda, 2003:03), thereby destroying the livelihoods of millions of families. For the most part, modern agricultural policies have promoted the commercialisation of farms, at the expense of local communities dependent on small-scale farming. In the pursuit of 'development' as defined by mainstream neo-liberal thinking, non-commercial farmers have been pushed off their land through a number of policies and programmes in favour of large-scale, commercial agriculture which is increasingly dominated by TNCs (highlighted in Section 2.3.3), (Patel, 2007:13-20). A key finding of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) is that the "small-scale farm sector in the poorest developing countries is a net loser under most trade liberalisation scenarios" (IAASTD, 2008:12).

Impacts of the modern food system on food producers include:

(i) *Loss of jobs*: Small-scale farmers are not able to compete with the high expectations for grades and standards that conform to uniform packaging regulations or stringent travel requirements (Reardon *et al*, 2002 in Pimbert, 2008:20) nor with the levels of subsidies that commercial farms in the developed world receive. Loss of livelihoods for small-scale farmers affects entire communities deriving incomes from localised food systems typically supported by small-scale farmers (Pimbert, 2008:12). In the United States today (even where agriculture is heavily subsidised), there are more full time prisoners than there are full time farmers (Halweil, 2004:61). Reducing numbers of farmers and farms indicates increasing concentration of ownership and control on food production.

(ii) *Farmers being underpaid*: There is a sharp disparity between what farmers are paid compared to what consumers are paying[18]. This disparity exists globally due to the rising costs of distribution and retail. "While speculators and large traders do benefit from the current crises, most peasants and farmers do not benefit from the higher prices. They grow food, but the benefits of the harvest often get out of their hands: it is already sold out to the money lender, to the agricultural inputs company, or directly to the trader or the processing unit" (Via Campesina, 2008:07). For example, "fifty years

[18] "In the dairy and meat sector, because of the increased production costs, farmers even see their prices going down while consumers prices are shooting up" (Via Campesina, 2008:07).

ago, farmers in Europe and North America received between 45 - 60 percent of the money that consumers spent on food. Today, that proportion has dropped dramatically to just 7 percent in the UK and 3.5 percent in the USA" at the same time as "the global food sector continues to expand, now standing at one and a half trillion US dollars a year" (Pretty, 2001:02).

(iii) *Impacts on farming communities:* the loss of revenue for farmers creates a ripple effect for rural communities, destroying local economies and fuelling waves of urbanisation (Norberg-Hodge, Merrifield & Gorelick, 2002:115-116). Communities have largely lost control over their food and supporting food systems, largely as a result of the disconnected relationship they have with the corporate offices who make the decisions and extract the profits (Halweil, 2004:44).

(iv) *Loss of independence*: farmers have lost the power to choose what they produce and how much they retail their products for. Furthermore, Via Campesina (2008) recognises that "some peasants and small farmers may have access to land but are forced to produce cash crops instead of food. The contract farming model creates a situation in which farmers cannot produce food for their families as they have to produce cash crops as monocultures such as sugar cane, palm oil, coffee, tea and cacao. This means that even if the farmer receives a minor increase for his cash crop, he has to buy much more expensive food on the market. Therefore increasing food prices also cause more poverty in farmer's families" (Via Campesina, 2008:08).

(v) *Impacts on local knowledge and management systems*: Pimbert (2008) recognises how growing corporate control through the globalisation of the food system has eroded "indigenous knowledge and ecological sustainable management systems based on local institutions and rights" (Pimbert, 2008:20). It is important to note that globalisation has simultaneously created opportunities for shared learning experiences between small-scale farmers and networks of support, and allowed for the emergence of global movements to counter the modern food system.

Small-scale farmers are critical to the successful functioning of the food system as they are considered more productive per square meter[19] (Rosset, 1999; Halweil, 2004:75) thereby contributing to greater food security and generating greater employment per square meter[20] (Pretty, 1998:197) thereby promoting greater livelihood security. It will be put forward in Section 2.5.3 that small-scale farmers are often better stewards of the land as they employ a range of on-

[19] Smaller farms vary in being between 200 and 1000 times more productive per square meter (Rosset, 1999).

[20] Farms in the UK under 40 hectares are estimated to provide five times more per-hectare employment than farms over 200 hectares (Pretty, 1998:197).

farm methods to recirculate nutrients and tend to grow a diverse range of crops that lend themselves to more agroecological[21] approaches (Pretty, 1998:197-198). An inverse correlation has also been established between the size of farms and the well being of communities that they form part of (Goldschmidt, 1975:171-175 in Hailwel, 2004:68).

The World Bank and other neo-liberal economists are arguing that small-scale farmers stand to benefit from increasing demand and the rising price of food. They argue further that this will stimulate agriculture in developing countries and thereby also the growth of domestic infrastructure to support the growing agricultural sector (FAO, 2008:02). This is unfortunately not the case as tariffs and other trade barriers (as have been described) prevent small farmers from competing on global agricultural markets (McMichael, 2006:172-174). Many of these farmers are struggling to produce viable agricultural outputs as they have been left to farm on marginal land destroyed by soil degradation. Discourse from neo-liberal economists does not fit with the increasingly mainstream view of agricultural economists who, from the data, recognise the complexity of our agricultural systems and transcend the reductionism of modern approaches to agriculture and the food crisis (IAASTD, 2008).

Furthermore, the World Bank and other international organisations such as the WTO are promoting further trade liberalisation coupled with investment for intensive agricultural output through large commercial farms as an answer to the current food crisis (Via Campesina, 2008:08). This short-sighted approach is pushing a green revolution through TNCs across Africa, with little consideration given to the impact of this on local communities and the environments which support them. The failure of the green revolution in India should serve as an important lesson for African countries (Shiva, 1991; Kate, 2008; Kelly, 2009).

Small-scale farmers dependent on modern agricultural methods are increasingly vulnerable in the context of climate change and peak oil (discussed below and in Section 2.3.5). The loss of further small-scale farmers, as a result of the impacts of the modern food system, will be to the detriment of development globally as urban growth is fuelled, dependencies on smaller numbers of commercial farmers grow and knowledge systems are further eroded. This will further threaten both food and livelihood security.

Impacts of modern agricultural production methods on the environment

Agricultural systems have grown considerably to meet the human population's growing demand for food, more than doubling agricultural production over the past five decades (Oviedo, 2008). Whilst

[21] Agroecological refers to agricultural systems which are assessed and valued from an ecological and socio-economic perspective; and promote ecological relationships in agriculture in order to develop healthy and sustainable systems of agricultural production (Goering *et al*, 2001:62; Pretty, 2002:viii).

modern methods of agricultural production based on HEIs (such as chemical fertilisers, pesticides etc) and the commercialisation of agriculture (for example, large scale monocropping) have certainly increased agricultural outputs, this has been at the cost of the environmental resource base which supports life (Shiva, 1991; Pretty, 2002; IAASTD, 2008). Further concerns are being raised about the impacts on food security (with a high dependency on chemical inputs), livelihood security (whereby small scale farmers become indebted as a result of modern agricultural methods) and global vulnerability in the context of climate change and peak oil.

Modern agricultural methods have been one of the driving factors resulting in accelerated loss of biodiversity and severe ecosystem degradation (MA, 2005:01; IAASTD, 2008:14). High external inputs degrade the quality of the soil and supporting natural environment over time, ultimately resulting in decreased productivity (Pretty, 1995; Pretty, 1998). Environmental impacts associated with modern agricultural methods are well documented and include soil degradation, pollution of the natural environment and loss of biodiversity (Pretty, 1998; Singer & Mason, 2006; Magdoff, 2007; IAASTD, 2008:07).

Biodiversity can be considered our genetic library, providing answers to problems we aren't even aware exist (Edwards, 2008). Loss of biodiversity and other ecosystem services would cost the agricultural sector billions of dollars every year[22], all services that are currently provided at no cost (Costanza *et al.,* 1997; Pretty, 1998:07). Loss of genetic diversity in agricultural crops is a major concern, and we presently derive more than half of the plant-based calories of the human diet from four plant species – wheat, maize, rice and potato (Madeley, 2002:21; Oviedo, 2008), seriously reducing the capacity of local communities to adapt to pests, diseases and climatic variations (Edwards, 2008). In many cases, a loss of agricultural diversity is also a loss of cultural diversity as we are increasingly losing knowledge and understanding of local species as they disappear from our farms and our plates. Loss of "environmental knowledge, practices and institutions will inevitably undermine food security, ecosystems and social systems" (Pimbert, 2008:24).

Soils are one of the most important natural resources which sustain our capacity to produce agricultural produce. Market imbalances alone cannot account for reducing agricultural productivity, which is also as a result of soil and ecosystem degradation (Swilling & Swilling, 2008:24). According to Scherr (1999:31), between 5 and 12 million hectares of land are abandoned annually due to soil degradation. The soil degradation reflected in Figure 4 (showing degraded land as percentage of total land used) has come about from agricultural practices, overgrazing and bad land practices giving rise to soil erosion and insufficient attention to soil nutrition (Scherr, 1999:01-03,17). Global trade of products originating from areas affected by soil

[22] The value of the world's ecosystem goods and services are estimated to contribute US$16 – 54 trillion per annum (Costanza *et al*., 1997).

degradation encourages the land to be further utilised, further entrenching the environmental degradation and ultimate poverty of the region. Critical attention must be given to the state of our soils, which will require new approaches to farming being adopted in order to avoid loss of agricultural output and serious food security challenges.

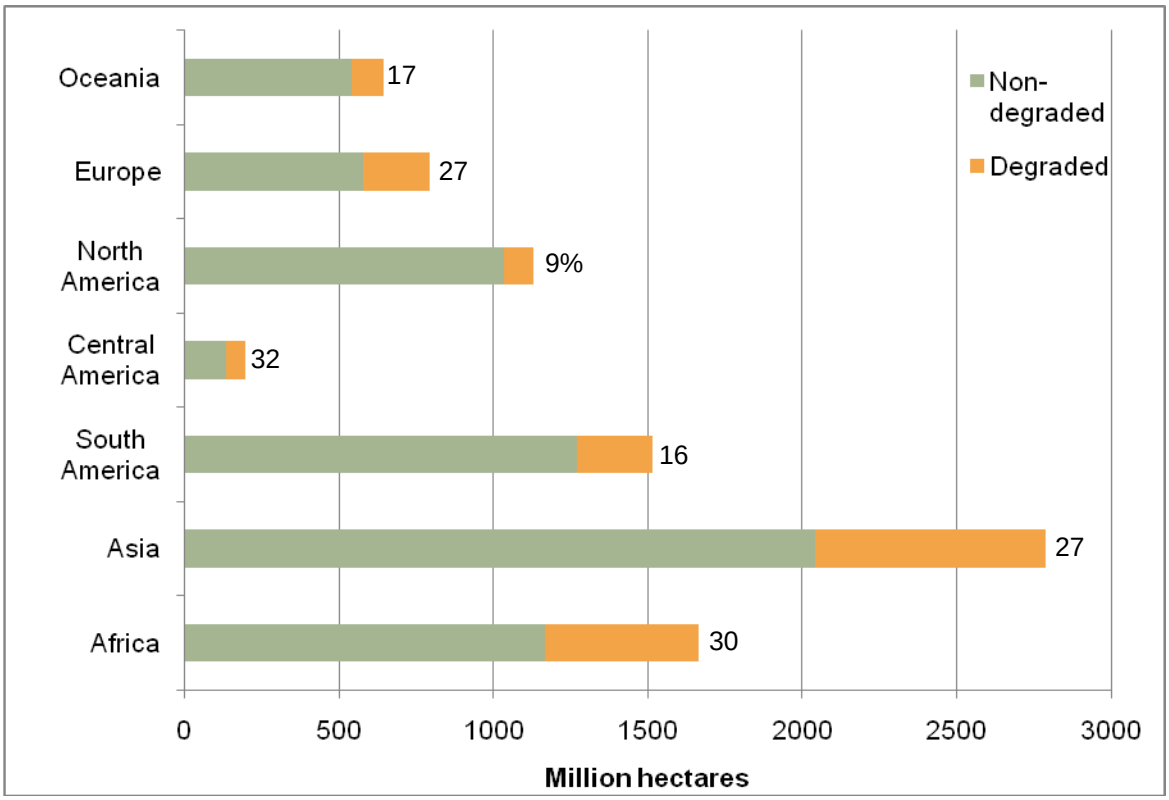


Figure 4: Global estimates of soil degradation

Source: Adapted from Scherr, 1999:18

A further major concern arising for the functioning of the modern food system is the impact on fresh water supplies. Modern agricultural methods of production contribute to the "large scale groundwater overexploitation, heavy appropriation of streamflow resulting in widespread river depletion and damage to aquatic ecosystems, fisheries and biodiversity. Environmental degradation and loss of production potential is caused by water pollution from agricultural chemicals, water logging and salinisation" (SIWI, 2004:03). International trade of food has facilitated the movement of virtual water (water embodied in the production of food), (Pearce, 2006:23-24). Agriculture (especially for export or cash crop production) in water scarce regions compromises the ecological integrity and environmental security for local communities. A key concern being raised in the context of climate change is the need for measures that protect both the quality and quantities of water available for agriculture as well as basic human consumption and ecosystem services (SIWI, 2004:03).

Furthermore, the modern food system has played a large part in contributing to climate change through the intensity of the system (IPCC, 2007:05; IAASTD, 2008:14). Fossil fuel makes up a large percentage of inputs for HEI agriculture, argued to be necessary for producing at intense levels. Other intensive methods of farming produce outputs that cannot be reabsorbed into cycles of production (e.g. sewerage from concentrated animal farms) and instead contribute to climate change and other forms of environmental pollution. The modern food system is highly dependent on fossil fuels for the energy embodied not only in farm inputs such as fertilizers but also in the methods of distribution which rely on packaging, refrigeration and long haul transport. Fuel dependency is not only a major concern given its contribution to climate change, but also due to the critically unstable nature of an addiction to a non-renewable resource soon reaching its end. The future impacts of climate change and the end of cheap oil will be considered further in Section 2.3.5.

Conclusions

In essence, the modern food system is driven by a neo-liberal approach which places efficiency in the pursuit of profit maximisation over development objectives. SAPs and other trade liberalisation policies do not fundamentally recognise the right to food for survival nor the importance of small scale agriculture for livelihoods but instead promote systems which externalise both social and environmental costs in the pursuit of profit maximisation under the banner of development. Modern methods of food production are in many cases directly or indirectly subsidised by tax payers' money (Norberg-Hodge, Merrifield & Gorelick, 2002:104-105). As recognised, small scale farmers have been the net losers in trade liberalisation (IAASTD, 2008:12), pointing to a system in crisis given the importance of supporting small scale farmers for the livelihood security of half of the world's population (UNEP, 2008:03). Furthermore, the trading of food as a commodity, driven predominantly by TNCs, has resulted in fluctuating food prices for basic produce that has dramatically affected food security (FAO, 2008) and will be explored further in Section 2.3.4.

Pretty (1999) refers to the externalisation of costs in modern agriculture whereby the prices paid by consumers at the end of the supply chain do not reflect the cost of the environmental and social degradation as a result of the modern food system. This encourages activities that benefit an elite few, but carry significant costs to society as a whole that are exceptionally difficult to quantify given the extensive scope of their impacts (Pretty, 1999:56-57). The modern food system in essence forces farmers to externalise social and environmental costs in order to remain competitive, or in most cases, simply survive. In this way, corporate control of the food system is further entrenching cycles of poverty and hunger for local farmers across the world, and the secondary industries and communities that they support. The methods of modern food production are exacerbating environmental degradation and vulnerability for communities around the world.

2.3.3 Overview of distribution

> "We have enough food on this planet today to feed everyone, but the way that markets and supplies are currently being influenced by perceptions of future markets is distorting access to that food. Real people and real lives are being affected by a dimension that is essentially speculative." Achim Steiner, United Nations Environment Program (UNEP) Program Director

An overview of global distribution of food within the modern food system is provided, including issues of unequal distribution, global control of the food system and growth in international trade.

According to the Food and Agriculture Organisation (FAO), the planet has enough food to feed up to 12 billion people (FAO, 2002b). At present, severe global inequalities exist and point to the poor distribution of available food resources and concerns over the affordability of food. Over 900 million people are estimated to be malnourished[23], in comparison with 1.6 billion overweight adults (WHO, 2005). Today's global society is jointly faced with the challenges of undernutrition and obesity which both can be considered forms of malnutrition and an impediment to food security. This highlights several flaws within the modern food system including the unequal distribution of food and poor nutritional value of food being received.

Trade liberalisation has encouraged the growth of TNCs and their consolidation of market power through their increasing control of both the horizontal and vertical levels of the value chain (Patel, 2007:11-14). This 'hourglass' of the food system is placing TNCs in a position to entrench dependency on their own products. For example, many TNCs control parts of the food chain from the Round-Up ready genetically modified (GM) seeds through to financing institutions and purchasing and distribution chains that bring the products to their franchised retail outlets (Halweil, 2004:47; Barker, 2007:07; Patel, 2007:11 – 14, 280). Furthermore, intellectual property rights "limit the ability and rights of farmers and indigenous peoples to save and exchange their seeds" (Pimbert, 2008:20). In this way, TNCs dominate the modern food system globally, undermining non-commercial and small scale farmers, and often with disregard for the long term environmental and social sustainability of the land they are cultivating.

Transnational supermarkets and wholesalers are able to dictate food prices which undercut the producers yet increase costs for consumers as other costs of retail continue to rise (Hailwel, 2004:45; Pimbert, 2008:20). Furthermore, supermarkets through which food is increasingly distributed are typically responsible for destroying two to three jobs for every job they create (Norberg-Hodge, Merrifield & Gorelick, 2002:28), and depressing local economies as profits are

[23] Most recently estimated at 923 million malnourished in 2007 (FAO, 2008:2), but expected to in fact stand at over 1 billion after the food crisis of 2008 and economic crisis of 2009.

extracted to distant corporate headquarters. “Retail-led chains hold a different economic and social relationship with the local and regional landscape ... they are concerned with abstracting value from it, rather than capturing value for it” (Marsden & Smith, 2005:449). In USA, 10 cents of every food dollar[24] goes directly to the Philip Morris corporation and 6 cents to the Cargill corporation (Gorelick, 2009:09) and half of the world’s largest economies are corporations (Norberg-Hodge, Merrifield & Gorelick, 2002:08).

The flow of food internationally has been facilitated by trade liberalisation and large scale distribution networks (often heavily subsidised by governments in the form of transport routes or cheaper fuel). International trade of food produce has grown dramatically in the past few decades[25], with food being transported long distances in the pursuit of economic efficiency with little consideration for social or environmental implications. Over 70 percent of international trade in agricultural inputs and products over the past 50 years has been between TNCs (Madeley, 2002:121). International food trade is associated with the long distance transport of food, dependent on increasing expensive fossil fuels and an important contributor to green house gas emissions (Madeley, 2002:117; McMichael, 2006:179). “The immense environmental cost of shipping foods long distances, for example, is not paid by the producer, the marketer or the individual consumer, but by society as a whole” (Norberg-Hodge, Merrifield & Gorelick, 2002:29). Further discussion into the issue of food miles is provided in Section 2.4.3, including considerations of embodied energy and total carbon footprinting for food produce with various benefits and limitations being raised.

Whilst international trade of food has helped countries in crisis and facilitated bringing new produce to new markets, what does not add up is importing produce that is being exported from the same country. For example, in 2001 Britain exported 111 million litres of milk and 47 million kilograms of butter only to import 173 million litres of milk and 49 million kilograms of butter (Norberg-Hodge, 2009a). Furthermore, export oriented crop production “depresses local food production and leaves people dependent on market forces beyond their control” (Goering *et al*., 1993:40).

In summary, global trade in the pursuit of profit maximisation has resulted in the large scale movement of food internationally that externalises social and environmental costs of production and distribution (such as contributions to and impacts of climate change) whilst leaving communities vulnerable in the context of peak oil (Hopkins, 2008:104-109).

[24] Food dollar refers to the money spent by consumers on food.
[25] International trade in food has quadrupled since 1961 (Singer & Mason, 2006).

2.3.4 Overview of consumption

Global consumption will be reviewed in the context of global food insecurity and poor nutrition linked to market forces and the commoditisation of food. Concerns over meeting future demand for food will be raised, and elaborated in Section 2.3.5

Food security is fundamentally threatened when people cannot afford the price of basic food produce. By mid-2008, real food prices were 64 percent above 2002 levels with the only similar price hikes being experienced in the early 1970s with the first international oil crisis (FAO, 2008:09). Heightened unrest stemming from hunger during the 2008 food crisis raised awareness to the state of global food insecurity (refer to Figure 5 below). Increasing food prices affected quality of life directly for millions of people across the globe, especially given that prior to the food crisis poor urban households already spent an estimated 60 to 80 percent of their incomes on food (FAO, 2000, UNEP, 2008:06).

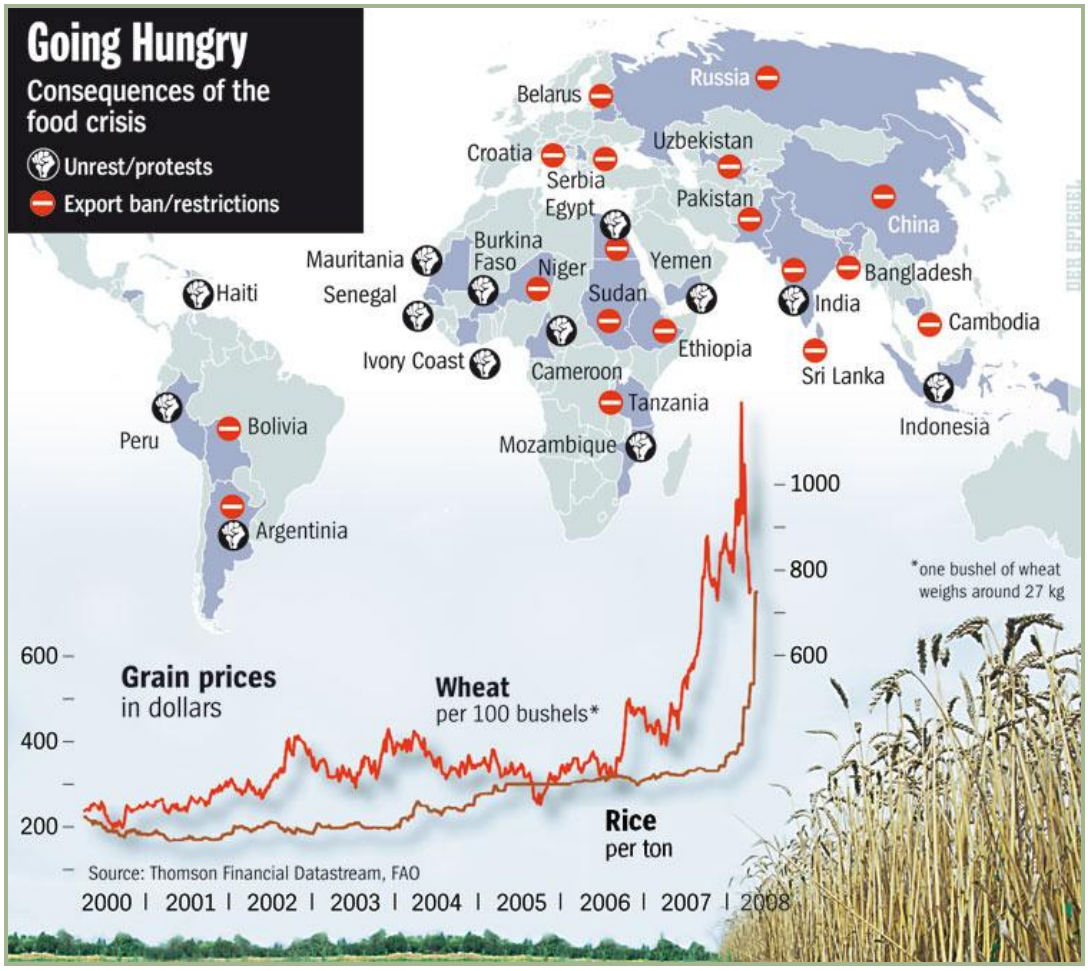


Figure 5: Increasing unrest in light of rising food prices

Source: Der Spiegel, 2008

The current state of global food insecurity[26] (linked to the unequal distribution of food) can be traced to "the availability of food, access to available food and the means to acquire the food (i.e. the ability of the household to generate sustainable income to afford the food prices)" (Khoza, Troskie and Jacobs, 2009:101). The global impacts of the recent food crisis in 2008, in a world where we are currently producing enough food (FAO, 2002:09), suggests that the manner in which the modern food system operates is not promoting food security. At the same time that millions of people were experiencing high food prices and food insecurity, large corporations realised increasing profits[27].

The State of Food Insecurity 2008 reported that "long term structural trends underlying growth in demand for food have coincided with short-term cyclical or temporary factors adversely affecting food supply, thus resulting in a situation where growth in demand for food commodities continues to outstrip their growth in supply" (FAO, 2008:09). Within this, driving factors of the recent food crisis have been identified as changes in agricultural practice in China, India, the European Union and USA leading to reduced production and price volatility, extreme weather events affecting cereal producing nations and hikes in petroleum prices resulting in higher fertilizer and transport costs[28] (FAO, 2008:11). Demand side forces behind the food crisis have been attributed to increased demand for biofuels and changing consumption patterns[29]. Other factors referred to include the trade policies enforced in response to the food crisis (such as export bans and restrictions) and financial markets including the "high level of speculative activity in agricultural commodity markets" (FAO, 2008:11). It is critical to recognise that all of these drivers are not short term, but rather long term concerns with the state of the modern food system.

Whilst the worst of the crisis passed in 2008, prices have not recovered fully[30] and are expected to remain high because of the economic growth and urbanisation of developing countries (resulting in shifting diets) and increasing biofuel demand. Furthermore, "in addition to land and water constraints, increasing costs of production, including higher fertiliser prices and rising transportation costs resulting from high petroleum prices, are likely to affect food production adversely, compounding the challenge of meeting global food demand" (FAO, 2008:11). The

[26] Close to one sixth of the world's total population is considered malnourished (FAO, 2008:02). A further two billion people are considered to suffer from micronutrient deficiencies or 'hidden hunger' (Kennedy, Nantel & Shetty, 2003:08).
[27] In the quarter ending February 2008, Cargill's profits rose 86 percent and Bunges by 2000 percent (Paul and Wahlberg, 2008:07)
[28] Transport costs doubled and fertilizer prices tripled between 2006 and 2008 (FAO, 2008:11)
[29] Increasing urbanisation, especially in China and India, is sharply changing dietary patterns and increasing demand for meat and dairy (FAO, 2008:11).
[30] In sub-Saharan Africa 80 to 90 percent of all cereal prices monitored by FAO in 27 countries remain more than 25 percent higher than before the food crisis two years ago. In Asia, Latin America and the Caribbean where prices are monitored in a total of 31 countries - between 40 and 80 percent of these remain more than 25 percent higher than in the pre food-crisis period (FAO, 2009).

impacts of the 2008 food crisis could potentially be marginal in comparison to a long term state of food crisis that we appear to be heading towards with the current trajectory of the modern food system.

> *"This crisis could result in a cascade of others and become a multidimensional problem affecting economic growth, social progress and political security around the world"*
> *UN Secretary-General Ban Ki-Moon (April, 2008)*

The inability of the modern food system to allocate food evenly is affecting the poor and marginalised most severely – those who do not have access to viable land for food production or access to reasonable markets to purchase food (Pimbert, 2008:20). Declining food production will have further impacts on the poor who already are struggling with the high prices of food produce and the poor will be forced into consuming food produce that is nutritionally poorer. Figure 6 highlights how high food prices affect not only the food security of communities, but have multiple impacts on their livelihood security that further entrench malnutrition.

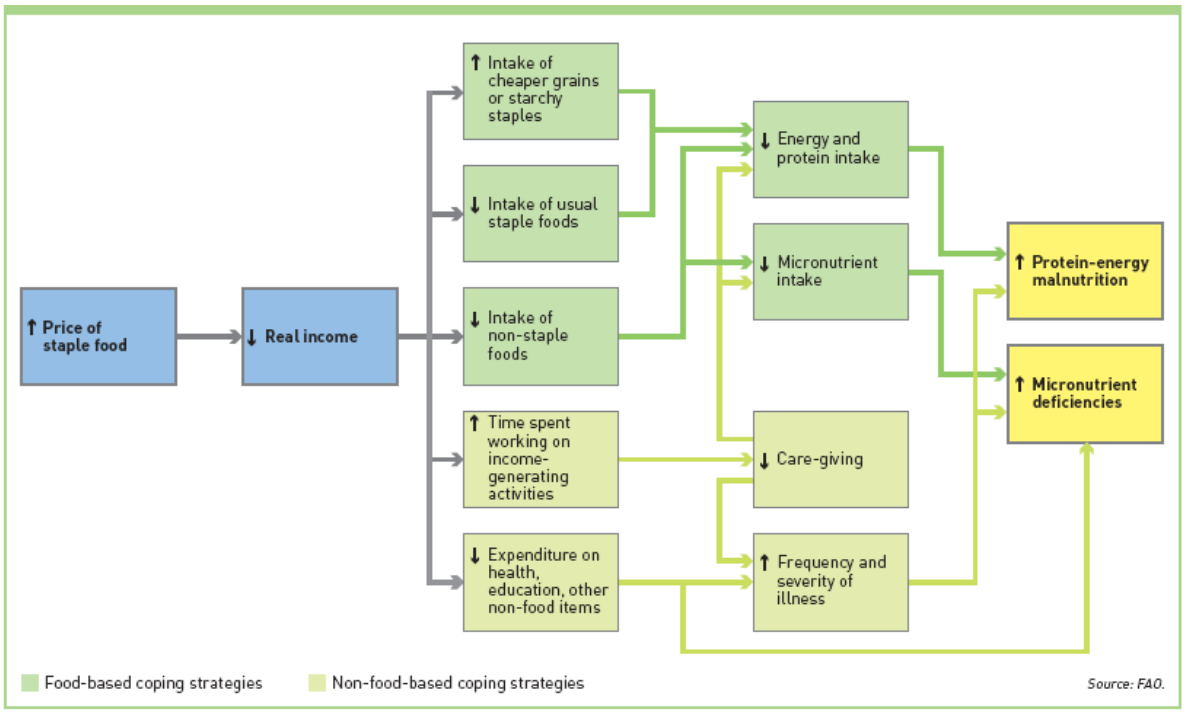


Figure 6: Household coping behaviours and nutrition impacts following sudden food price rise

Source: FAO, 2008:28

Beyond the impacts of high food prices and the looming threat of decreasing total production (discussed further in Section 2.3.5), the modern food system plays a large role in contributing

towards the poor nutritional content of the food being consumed across the world (strongly linked to the profit maximisation agenda of the corporations that control the food system). As recognised by Norberg-Hodge *et al*., "one of the biggest threats to food security today stems from the increasing control a handful of corporations have over the world's food supply" (Norberg-Hodge, Merrifield & Gorelick, 2002:35).

Major concerns around the state of global food security include:

(i) *Reducing diversity*: an increasing characteristic of the modern food system, closely linked to the control held by TNCs, is the homogenisation of food products and decreasing diversity of available food products (Norberg-Hodge, Merrifield & Gorelick, 2002:96). Nutrition and food security are compromised and deeply vulnerable through dependency on a small number of crop types and further monocropping within these crop types (Oviedo, 2008).

(ii) *Capacity to travel valued over nutritional value*: food grown in the modern food system is geared towards withstanding mechanical harvesting and long-distance transport and not grown for their nutritional content. Furthermore, vitamins in most food produce are lost over time after harvest and even 'fresh' foods in the modern food system are typically less nutritious (Norberg-Hodge, Merrifield & Gorelick, 2002:51; Edwards-Jones *et al*., 2008:271).

(iii) *Increasing levels of processing*: given that higher returns are made on processed produce, they are typically well marketed (Patel, 2007) and the dominance of processed food in a growing number of diets despite poor nutritional value of these products points to serious challenges of the modern food system. When carbonated corn syrup soda drinks can be sourced at the same price or cheaper than potable water[31], this is indicative of a system that externalises costs of production whilst impacting negatively on the natural resource base that sustains life. Obesity is an epidemic in both the developed and developing nations of the world and is no longer associated only with wealth but as a manifestation of poor nutrition (WHO, 2005).

(iv) *Compromised food safety*: the modern food system is promoting food production at an intensity that is prone to compromising food safety and human health. The negative impacts of concentrated animal farming operations (CAFOs) that keep unnaturally high quantities of livestock in small areas in the pursuit of 'efficiency' include outbreaks of disease (such as salmonella or Mad Cow Disease) as well as the high prevalence of hormones and antibiotics (Norberg-Hodge, Merrifield & Gorelick, 2002:58-61).

[31] Personal experiences in Mexico, December 2006 and Egypt, November 2008.

Ashley (2008:09) recognises that the challenges within the modern food system are “a result of a range of interrelated factors that can only be described as a system-made crisis. Here we mean the outcome of subjecting a basic human need and universally recognised right to food to the logic of profit, to the market and to global competition driven by multinational corporations. In short, it is a crisis of capitalist globalisation and neo-liberalism” (Ashley, 2008:09).

We cannot afford to disconnect food security from the reality of severe inequalities, and need to address a global balance of food supply which is grounded by the recognition that starvation and obesity are occurring simultaneously. The modern food system is compromising food security on multiple levels, including limited access to food produce, inflated food prices, reducing food diversity and poor nutritional content of food. Food security will be further compromised by future demand on the modern food system currently unable to allocate food fairly or sufficiently.

2.3.5 The modern food system in the context of a global polycrisis

Beyond restructuring the present global agricultural system towards ecological and social sustainability, there is a need to place this within the context of wider global challenges as well. Increasing environmental degradation is decreasing agricultural productivity in many regions and is set to intensify if present methods of agricultural production continue. Climate change is forecast to change patterns of rainfall and seasonal temperatures, which will have significant impacts on agricultural production globally and regions such as Sub-Saharan Africa, where vulnerability is greatest, are expected to experience the impacts of climate change the worst (IPCC, 2007). Changes in climate patterns and predictability will severely affect agricultural systems globally as varying temperatures begin to further influence rainfall and soil productivity, amongst other factors. This will severely impact the productive capacity of the agricultural sector, and especially those already farming on marginal land. The impact of climate change in Sub-Saharan Africa is expected to be especially harsh as temperatures increase and rainfall decreases whilst rainfall events become more intense (Hewitson, 2006; Johnston, 2009). This will have important implications for the small-scale and subsistence farmers who are concentrated in this region (IPCC, 2007:11); especially given that 70 percent of employment in Sub-Saharan Africa is generated from agricultural activities. Furthermore, the IPCC estimates that rain fed agriculture could reduce by up to 50 percent in certain countries whilst between 75 and 250 million people will be exposed to increased water stress by 2020 (IPCC, 2007:11). “As these changes disrupt the vast intercontinental web of food production and rearrange the world’s major breadbaskets, depending on food from afar will be more expensive and more precarious” (Halweil, 2004:38).

The current approach of modern agricultural methods increases the exposure of both consumers and producers to shock. Monocropping with limited species variance drastically increases

vulnerability to crop failure, especially in context of climate change (Madeley, 2002:29). Of equal importance, modern agricultural approaches promote increased dependency on external inputs, which undermines the capacity and self-sufficiency of farmers in the long term (Madeley, 2002:28). Figure 7 below highlights how rising food prices are linked to increasing fossil fuel prices. With prices for fossil-fuel based products set to increase and in the context of increasing weather variability as a result of climate change, modern agricultural approaches are leaving farmers (both commercial and small-scale), as well as the majority of the human population depending on them for survival, increasingly vulnerable (Peters *et al*., 2008:02).

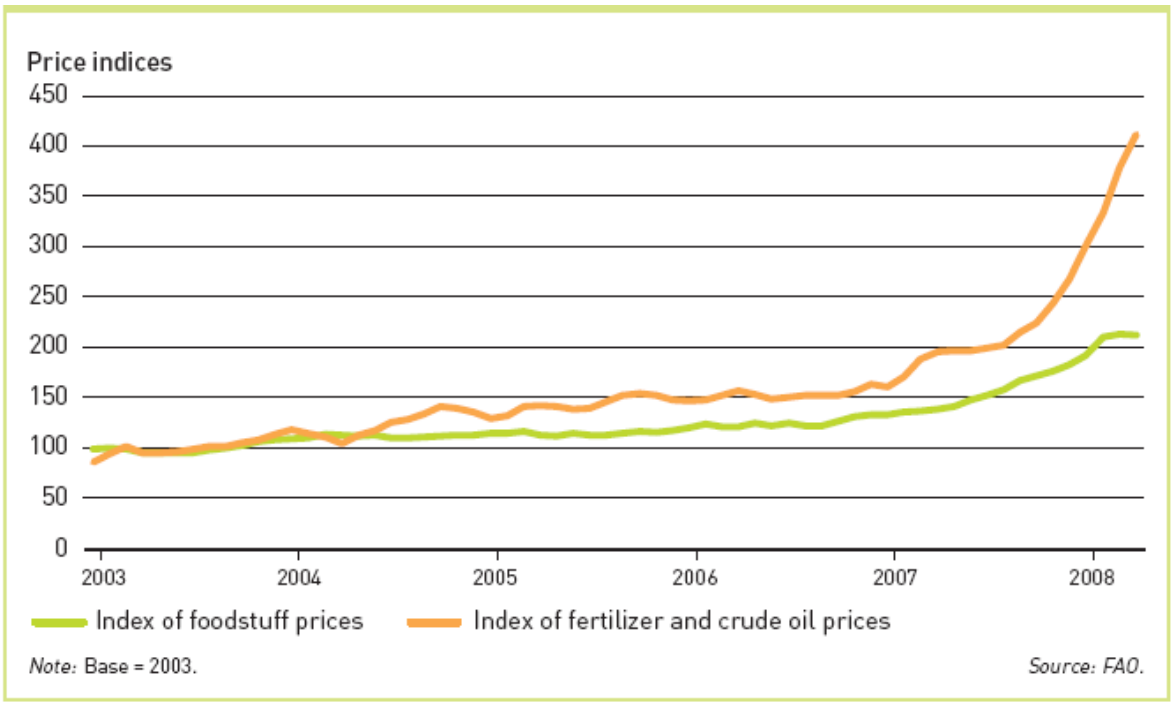


Figure 7: Input prices outpace food prices

Source: FAO, 2008:35

As populations continue to grow and demand for food increases[32], the food crisis will deepen if the drivers behind this global challenge (a combination of complex and interconnected market forces in the context of increasing environmental degradation) are not addressed as a matter of pressing concern. The agricultural sector will soon have to provide sufficient produce for 10 billion people (by 2050), and this raises alarm bells as to the capacity of a degraded environment to sustain our growing global population. Population growth will mainly be realised through growth within urban areas (UNFPA, 2007) and this highlights the importance of addressing food security within the urban context. Pretty (2002:x) refers to the 'nutrition transition' as the "effect of increasing

[32] "By 2050, global population is projected to be 50 percent larger than at present and global grain demand is projected to double" (Tilman *et al*., 2002:671).

urbanisation on people's adoption of new diets, resulting, in particular, in consumption of more meat and fewer traditional cereals". This is placing increased strain on grain supplies for feed stocks and therefore also on the natural environment to provide such grain whilst not necessarily ensuring improved nutrition for the urban poor (IAASTD, 2008:17). Supply has already not been able to keep pace with rising demand, resulting in higher food prices, which will be aggravated by increasing demand[33] from growing populations.

In response, economists and politicians are pushing for the intensification of agricultural practices, increasingly through commercial farming. This push towards increased agricultural output is promoting further dependency on fossil fuel based agriculture. At the same time, little attention is given to the need for market regulation and stabilisation, as well as their impacts on peasant farmers (Via Campesina, 2008:08). A key finding of UNEP and UNCTAD's report on the potential of organic agriculture for Africa found that the intensification of modern agriculture should not be pursued in light of the failure to address poverty and hunger (UNEP UNCTAD, 2008:vii).

Should developing countries strive to maximise economic growth through intensive development of their agricultural sector for export crops (such as coffee or cacao), at the social and environmental cost of their nation? Or should they look towards methods of agriculture which ensure food security, viable livelihoods and improvement in quality of life for the majority of their people? In the context of the challenges which have been highlighted, stemming from a combination of drivers that are complexly connected, a new approach to food and livelihoods security must be pursued.

2.3.6 Section Summary

The commoditisation of the food system, which does not recognise food as a fundamental human right, has resulted in the marginalisation of small-scale farmers and loss of livelihoods, the failure of market systems to allocate food equitably and severe environmental degradation globally (McMichael, 2006; Patel, 2007). The modern food system appears to be inherently unsustainable, socially unequal and deeply vulnerable, but continues to survive under highly subsidised, controlled and distorted conditions (Norberg-Hodge, Merrifield & Gorelick, 2002:12; Madeley, 2002:15). "Even economists and politicians who might be staunch free traders … would likely agree that raising all the world's food in a declining number of places, planted with a dwindling number of crop varieties, and controlled by a shrinking number of companies is simply foolish. They might even call it a recipe for disaster" (Halweil, 2004:14). Furthermore, the increasingly centralised control of modern food production and distribution has disconnected consumers from

[33] "Global demand for cereals will increase by 41 percent between 1992 and 2020, with 80 percent of this increased demand coming from developing countries. Meat demand will increase by 63 percent, and demand for roots and tubers by 40 percent, with 90 percent of this increase coming from the developing world" (Scherr, 1999:31).

the food systems which sustain life and from the consequences of the manner in which this system currently operates.

The current global polycrisis and future challenges of climate change and peak oil will see the availability of food being further threatened and there are major concerns over whether we will physically be able to meet future demand for food. For our global food system, sustainability could perhaps be "best characterised as the need for food and livelihood security under increasingly constrained environmental conditions from within and outside the realm of agriculture and globalised economic systems" (IAASTD, 2008:03). We can no longer afford to "subsidise inefficient and unsustainable systems and simultaneously generate the funds required to eradicate poverty and compete with economics that are dematerialising their consumption and production systems" (Swilling, 2007:03). There is a pressing need to shift towards a new global food system which places value on sustainability through ecological integrity and democratic equality.

2.4 The local food movement

The evolution of the local food movement is presented in the context of a growing counter movement to the modern food system. Core recommendations are put forward for a global transition to local or community orientated food systems and the arguments presented in support of local food systems reviewed. In the absence of global reform[34], local food economies are understood in the context of the current modern food system and a definition of local food economies is presented for investigation in Section 2.5.

2.4.1 Counter movements to the modern food system

In response to the challenges presented by the modern food system, a ground swell of counter movements are emerging, including initiatives to promote agroecological farming methods and the productive use of urban space, campaigns to support farmers and their right to land, programmes to introduce fairer systems of distribution and ensure adequate nutritious food for all (Winter, 2003:24). These counter movements are taking place in communities across the world and some are growing into international movements drawing on the positive effects of globalisation to connect individuals and communities across continents. Specific organised movements for an alternative food system based on premises of social and environmental justice and sustainability include La Via Campesina (campaigning for the rights of peasant and small-scale farmers); Fair Trade Labelling Organisations International (campaigning for 'a better deal for producers') and the

[34] It is understood that the global transition required to shift the global food system onto a sustainable trajectory through a community based approach is not likely to take place in the current political context.

Slow Food Movement (celebrating unique food cultures and promoting the social value of quality food through connecting people to food, their communities and the supporting land).

The local food movement has emerged as an alternative approach to the modern food system and draws on some of the same philosophies and motivations as other counter movements. The local food movement is not a formalised or registered campaign but rather a collection of initiatives at a community level working towards local or community oriented food systems (hereafter referred to as 'local food systems') that focus on local food production for local consumption. Motivations for the transition towards local food systems include community development and increased resilience (Norberg-Hodge, Merrifield & Gorelick, 2002:79; Hopkins, 2008:104) as well as reduced contribution to greenhouse gas emissions (Halweil, 2004:37) and are informed by principles of social justice and ecological integrity: local food systems "aim to be economically viable for farmers and consumers, use ecologically sound production and distribution practices and enhance social equity and democracy for all members of the community" (Feenstra, 1997:28). Today, localisation is growing in popularity in many communities across the world and the term 'locavore[35]' was declared Oxford word of the year for 2007 (Oxford University Press, 2007).

Core recommendations that would inform a global transition towards sustainable food systems are presented in Section 2.4.2 and the evolution of the local food movement in the absence of these global reforms is presented in Section 2.4.3.

2.4.2 Towards sustainable food systems

A set of recommendations are put forward that are argued to promote greater sustainability through the global food system. "Our global food system is in the midst of a multifaceted crisis, with ecological, economic, and social dimensions. To overcome that crisis, political and social changes are needed to allow the widespread development of alternatives." (Rosset, 2002:xv). The reforms put forward at a global, national and local level focus on community based approaches to decision making that value social equality, political accountability, environmental sustainability and overall resilience in the context of the global polycrisis and need for greater sustainability that has been presented in Section 2.2.

Global reforms

A key reform on a global level would be the introduction of fairer international trade that would value food not as a commodity but as a fundamental human right, critical for both food and livelihood security. Core recommendations to promote fairer international trade include the removal of unfair subsidies and regulation of imported produce that could be produced locally (Halweil,

[35] Locavore refers to a person chosing to eat food from within their locality (typically defined as a 100 mile radius from place of residence), (Oxford University Press, 2007).

2004:139-141). Important issues to consider include the trade of embodied energy and water in the context of growing water scarcity and the need for a transition to a low energy future (Bentley, 2002:189; Pearce, 2006:24). This would not be a move against global trade but rather towards fairer global trade and increased community resilience in order to protect both producers and consumers (Feenstra, 1997:28; Francis *et al*., 2008: 92).

National reforms

A key national reform would be the prioritisation of food and livelihood security, with a shift in focus from export orientated production to local food security (Hailwel, 2004:141). The government of Cuba made food security a national priority under conditions of limited food supplies and fossil fuels which significantly improved levels of food security, (Nieto & Delgado, 2002:40; Levins, 2002:278), described further in Box 1. There is potential for extensive job creation through the deconstruction of control concentrating monopolies into more horizontally organised networks of food production and distribution on the local scale (Shuman, 1997:53).

Furthermore, national spending currently subsidising large scale transport networks, energy systems and conventional commercial agriculture should be redirected to support networks of small scale farmers producing with agroecological methods supplying more directly to local communities (Norberg-Hodge, Merrifield & Gorelick, 2002:104). Transport, energy and agricultural subsidies are promoting energy intensive forms of agriculture and distribution. If these subsidies were to be removed, sustainable food systems would have a chance of survival. If the subsidies were positively redirected to support food and livelihood security through an investment into small farmers, agroecological methods and ensuring fair access to nutritional food, sustainable food systems could potentially thrive. This is a key strategy to build a nation's resilience in the context of peak oil as well as climate change and population growth.

Local reforms

On a local level, there is incredible potential for building local food systems that promote greater sustainability through the reimagining of space and investing in the productive capacity thereof. Promoting local food production, in both urban and rural spaces, should be done through small-scale and decentralised networks of producers that promote resilience through diversity (Seyang, 2006:396). Economic structures, incentives and institutional support need to be put in place to support local producers and distributors and the buying of local produce (Marsden & Smith, 2005:449). These may include supporting local currencies and banks, mobilising campaigns in support of local produce and cooperatives for both producers and consumers. Local food regulations are critical for ensuring food safety in a manner that still allows small scale farmers to compete (Norberg-Hodge, Merrifield & Gorelick, 2002:108).

In the context of the current political and economic paradigm and the absence of global and national reforms, local food economies will be presented as the counter movement to the predominantly modern food system that continues to prevail.

2.4.3 Evolution of the local food movement

A review of the literature on local food movements revealed that there were a number of arguments presented in support of transitions towards supporting local food systems. For the purposes of this research, these motivations have been categorised into three core arguments (the pro-community argument, the climate change argument and the peak oil argument) which are described in detail below.

The pro-community (or anti-globalisation) argument

> *"If fresh food is necessary to health in man and beast, then that food must be provided not only from our own soil but as near as possible to the sources of consumption. If this involves fewer imports and consequent repercussions on exports then it is industry that must be readjusted to the needs of food. If such readjustment involves the decentralisation of industry and the re-opening of local mills and slaughter houses, then the health of the nation is more important than any large combine" Lady Eve Balfour, founder of the Soil Association, 1943 in Pinkerton & Hopkins, 2009:20.*

The oldest and most established argument for localisation of the food system originates from a motivation to promote the security of local communities which is in part informed by an anti-globalisation sentiment. Feenstra (1997:38) identifies key writings in the local food movement and describes how Lappe and Collins (1978) "articulated the economic and political realities of the global food system and how they are used to perpetuate the myth of scarcity and the continuation of hunger in communities worldwide" and "encouraged communities to take control of their own food economies". Wendell Berry further highlighted the "loss of community and culture that accompany the uncritical acceptance of agribusiness and mechanization in our food and agricultural system" (Feenstra, 1997:28).

Some of the literature and popular media around the local food movement have tended to focus on the local versus global debate, with local being perceived as 'virtuous' and global as 'evil' (Hinrichs, 2003:33). Winter (2003:30) refers to *defensive localism* whereby "the valorisation of local may be less about the radical affirmation of an ethic of community or care, and more to do with the production of less positive parochialism and nationalism, a conservative celebration of the local as the supposed repository of specific meanings and values".

Marsden and Smith (2005:443) articulate in response that "such conceptualisations of 'defensive localism' are clearly relevant in certain social and cultural contexts. However, with regard to agro-

food, it is not just the 'label' of local which is important, it is: (i) how the local is constructed and used in relation to new forms of economic and social networks; which in turn provide a basis for innovation and new types of economic development; and (ii), how these new spatially-based networks then set up and continue to demarcate their spatial and competitive relations and boundaries within the conventional food system".

Hinrichs (2003:37) recognises that "defensive food system localization tends to stress the homogeneity and coherence of 'local', in patriotic opposition to heterogeneous and destabilizing outside forces, perhaps a global 'other'" whilst "diversity-receptive food system localization demonstrates greater awareness and incorporation of these multiple meanings and struggle (and view) the local embedded within a larger national or world community, recognizing that the content and interests of 'local' are relational and open to change".

The local food movement certainly originates in part from a motivation to move beyond the downfalls of the modern food system and the consolidation of power on a global scale, but the true strength of the local food movement can be argued to lie in the pro-community stance motivated at building autonomy and resilience through social networks of support or 'embeddedness[36]'. "On one hand, localization may involve defensive, perhaps subtly exclusionary protection of a region constructed as discrete. But on the other hand, the very experience of localization can foster social and gustatory exchanges that demand new receptivity to difference and diversity" (Hinrichs, 2003:34). Pretty (2002:ix) describes sustainable foodsheds as "self-reliant, locally or regionally based food systems comprised of diversified farms using sustainable practices to which consumers are linked by the bonds of community as well as economy". In this context, localisation is central to sustainability not from a purely geographical perspective but by virtue of the community based accountability that localisation infers. Localisation may include aspects of defensive localism, but often local food movements aim to move beyond the narrow local versus global debate to promote food sovereignty through community.

La Via Campesina defines food sovereignty as "the right of each nation to maintain and develop their own capacity to produce foods that are crucial to national and community food security, respecting cultural diversity and diversity of production methods" (Pimbert, 2008:43). This places value on the manner in which food is produced, traded and distributed and places the autonomy back with local communities through controlling their own systems of food production and distribution. Localisation is the shift of power from disconnected corporations to the affected communities by building local resources and resilience. This refers to a shift from the

[36] Embeddedness refers to dense social networks and relations which value multiple forms of capital in decision making processes.

commoditisation of food that externalises social and environmental costs to embedding the value of food, livelihood and environmental security at a community level.

“Although the process of localization is often seen as a neat antithesis to globalization, this can be an overdrawn and problematic dichotomy” (Hinrichs, 2003:33). Localisation in the context described above is therefore not anti-global but rather pro-community. As recognised by Berry (2000), communities should first meet local needs where possible before exporting and should not be importing foods that can be produced locally. Among other benefits, this would stimulate thousands of local businesses as part of the global food system instead of a limited number of TNCs (Berry, 2000:33). “A better way to think of the goal of import substitution is that it motivates a community to move the most important and valuable types of production back home, not to unplug completely from the national or international economy” (Shuman, 1997:54). A key argument presented in support of local food systems is the potential to simultaneously build resilience against shock through reducing dependency on imported produce and strengthen the local economy through stimulating local enterprise and recirculating money in the local community (Ward and Lewis, 2002:20).

Furthermore, “a systems-oriented approach to the study of food and agriculture, drawing inspiration from ecology, stresses the inter-relatedness of the entire domain, and therefore resists discrete bracketing of ‘global’ and ‘local’” (Dahlberg, 1993 in Hinrichs, 2003:35). In this way, local food systems should be tailored to address their community’s needs as a first priority, which “does not mean they completely isolate themselves from trade, but that they adapt local food production and markets based on local environmental and community health priorities” (Feenstra, 1997:28). “Development led by import-replacement rather than export promotion diversifies, stabilizes, and strengthens the local economy” (Shuman, 1997:56).

One of the core arguments behind the local food movement is therefore the critical role that local food systems can play in building social networks and resources in support of community empowerment and resilience. Two more recently developed arguments in support of the local food movement have originated from different contexts, but will similarly be shown to value sustainability of the food system, and society as a whole, as driving motivations.

The climate change impact argument

A more recent motivation for localisation of the food system stems from a concern over contributions of long distance transport of food and the general functioning of the modern food system to greenhouse gas emissions and climate change. The increased interest in issues of

climate change over the past decade has led to further research around food miles[37] and the total carbon footprint of the modern food system. Figure 8 below highlights the large role that food production plays in contributing to ecological degradation, including the impacts of greenhouse gas production on climate change.

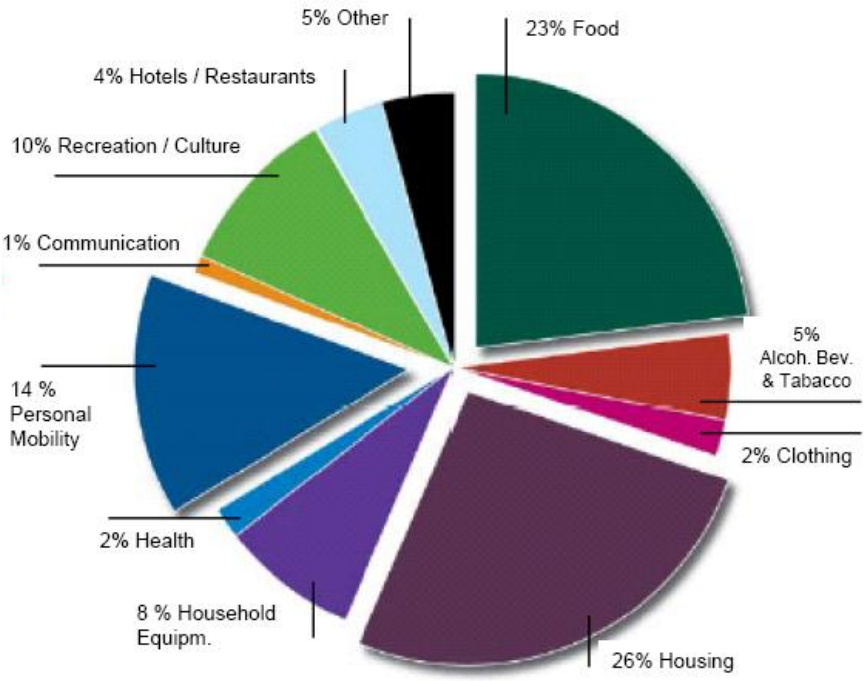


Figure 8: Global ecological footprint by demand areas

Source: Greenfield, 2009:07

Popular media has tended to focus on local food as an issue of food miles as an environmental concern raised against the modern food system that functions predominantly through large scale global trade (Cloud, 2007:44). It is true that "much transportation of food around the globe is only economically rational due to environmental and social externalities being excluded from fuel pricing" (Jones, 2001 in Seyfang, 2006:386) and is often completely unnecessary (such as the example of Britain's butter and milk imports and exports given in Section 2.3.3). Internalising the true costs of international shipping and reducing unnecessary international transport that the externalisation of costs has allowed to date would certainly play an important role in reducing the greenhouse gas emissions associated with international food transport.

Buying local may not always reduce carbon footprints associated with the transport of produce from the farm to the consumer as would be expected. A recent study by Coley, Howard and Winter

[37] For the purposes of this research, food miles is defined as the distance from farm gate to consumer's table.

(2009:150) found when comparing a farm shop with mass distribution approaches, that "if a customer drives a round-trip distance of more than 6.7km in order to purchase their organic vegetables, their carbon emissions are likely to be greater than the emissions from the system of cold storage, packing, transport to regional hub and final transport to customer's doorstep used by large-scale vegetable box suppliers".

In reality, food miles only represent a small part of a very complex story. In theory, promoting a reduction of travelling distance by localising agricultural production has its merits, but is in fact often not as significant as other contributors to climate change in the modern food system when considered in the context of the entire carbon footprint or life cycle assessment of most food products. Measuring the carbon footprint of food consumption[38] is critical in the bigger picture of climate change but is by no means simple and needs to take into account more than the greenhouse gas emissions associated with transport alone to assess total life cycle carbon footprints. "Carbon emissions from transportation are only a small part – around 10% - of the total emissions related to food; the lion's share comes from the use of fertilizers in conventional agriculture" (Sonntag, 2008:88). For example, meat and dairy produce are responsible for methane and nitrous oxide emissions[39] that also need to be taken into account (Trivedi, 2008:28).

Therefore, food's carbon footprint depends not only on where it was grown, but also (more importantly perhaps), how. This includes taking into consideration "gases generated by tilling the land, sowing the crops, making the fertilisers and pesticides, harvesting the food and shipping it to process plants, as well as electricity for cleaning, processing and packing your food, and then transporting it to your store. Finally, the loss of carbon sinks when forests are cleared for grazing or crops has to be accounted for" (Trivedi, 2008:28).

Weber and Matthews (2008:3508) found that "although food is transported long distances in general (1640 km delivery and 6760 km life cycle supply chain on average) the greenhouse gas emissions associated with food are dominated by the production phase, contributing 83 percent of the average U.S. household's 8.1t CO_2 (carbon dioxide) /year footprint for food consumption". In comparison, only 11 percent was generated through transport (farm to consumer) and 6 percent for wholesale and retail factors such as refrigeration and lighting (Weber & Matthews, 2008:3511). Of the 83 percent that was generated during food production, 37 percent was from CO_2 produced on farm, 20 percent from methane released by livestock and manure and 26 percent from nitrous oxide from fertilisers and manure (Weber & Matthews, 2008:3511). The study concluded that a

[38] Recent studies claim that food consumption in the US accounts for up to twice as much greenhouse gas emissions as driving (Trivedi, 2008: 28). (8.1 tonnes for food consumption, 4.4 tonnes for driving and 60 for total).

[39] Fertilisers and manure release nitrous oxide which is 296 times more effective than CO_2 at trapping heat and remains in the atmosphere for 114 years on average (Trivedi, 2008:28).

"dietary shift can be a more effective means of lowering an average household's food-related climate footprint than 'buying local'" (Weber & Matthew, 2008:3508).

Furthermore, dietary choices that would reduce meat and dairy consumption (and thereby energy consumption, methane production and unproductive ratios of inputs to meat outputs) would reduce food associated greenhouse gas emissions far more than localisation of production alone. It was found that in the USA, buying local everyday of the year would cut 4 percent of carbon footprint / 400kg CO_2 equivalent per year in comparison to shifting one day from red meat and dairy to chicken, fish or eggs which would lower emissions by between 252 and 400 kilograms (Trivedi, 2008:32).

Recent research by Pelletier, Arsenault and Tyedmers (2008:989) found from a study of wheat, corn, soya and canola that organically grown crops have a lower carbon footprint, producing only 39 percent of the energy and 77 percent of the greenhouse gasses (by removing nitrogen fertilizer in the cultivation process). This is context specific, as organic meat requires more energy to produce and organic fish produces 30 percent more greenhouse gasses (Trivedi, 2008:31). It was found though that an organic diet on average has a lower carbon footprint than a non-organic diet (Trivedi, 2008:31). The link between local and organic will be explored further in Section 2.5.2.

In an assessment of recent research on food miles and life cycle assessment, Edward-Jones *et al*. (2008:265) conclude that "food miles are a poor indicator of the environmental and ethical impacts of food production. Only through combining spatially explicit life cycle assessment with analysis of social issues can the benefits of local food be assessed". Indeed, "the concept of food miles had undoubtedly served an important ideological and political role in highlighting the importance of carbon footprints in the food system. To that extent it has been a useful device in the wider sustainability debate. But it is now time for businesses and consumers to adopt a more broadly conceptualised carbon accounting life cycle assessment" (Coley, Howard & Winter, 2003:154).

Several large retailers have undertaken carbon labelling schemes[40], with the arguable outcome that consumers will be more confused by the myriad of labels from organic to free range to fair trade to low carbon than empowered to make meaningful decisions that change the impact of their consumption patterns on the food system. Furthermore, there is still much uncertainty and debate within the carbon footprinting game and, given the great discrepancy between each context, it requires meticulous accounting systems to reflect accurate carbon footprints. "Given the paucity of studies published at any scale which analyse emissions from across the entire food chain, it is

[40] UK retailer Marks and Spencers label all air-freighted food (M&S, 2009) and UK retailer TESCOs have started labelling the full carbon footprint of their milk with plans to 'footprint' 500 of their products by the end of the year (Smithers, 2009).

currently impossible to state categorically whether or not local food systems emit fewer green house gasses than non-local food systems" (Edwards-Jones *et al*., 2008:270). The almost only consistent finding of all research on local food miles or carbon footprints is that each study can only be case specific and the context of each is so critical to the outcomes that broad generalisations do not stand (Peters *et al*., 2008:03).

Focussing on food miles is an extremely literal, narrow and limited interpretation of the term 'local' and even broadening this out to look at complete carbon footprints only empowers one to issue limited recommendations that remain situated within the modern food system perspective and focus on reducing carbon footprints. Whilst carbon footprints are certainly critical in an era of climate change, they are unable to measure or account for the much wider footprint on communities and the natural environment as a whole. The pressing challenges of climate change coupled with the end of cheap oil do, however, raise important questions around our dependency on food transported long distances (Peters *et al*., 2008:01).

The peak oil argument

The modern food system is critically dependent on the availability of cheap fossil fuels, and in the light of the end of cheap oil (outlined in Section 2.2.3) and the impacts that it will have on food systems (described Section 2.3.5), a growing argument is presented for local food systems that promote local resilience over oil dependency (Hopkins, 2008:104). Recent price increases have been linked to rising costs of fossil fuels, with severe impacts on food security and raising alarm for the state of future food security. "Growing concerns about climate change, the longevity of fossil fuel supplies and attempts to produce energy from agriculture suggest that energy efficiency will be critical to adapting to resource constraints and mitigating climate impacts" (Peters *et al.,* 2008:01).

A growing initiative that supports a transition to local resilience based on reducing oil dependency is the Transition Towns movement started by Rob Hopkins in the UK and of which local food forms a central tenet of resilient communities (Hopkins, 2008:104-106). In the recently published *Local Food,* Pinkerton & Hopkins (2009) document several successful initiatives to build local food economies that promote food security and ecosystem services whilst reducing dependency on external produce. The peak oil argument aligns strongly with the pro-community argument from the perspective of building community resilience but stems from a concern over oil dependency rather than the negative impacts of the globalised modern food system on local communities.

Critics of the local food movement may cite local food as a 'luxury' that less affluent communities cannot afford, given the tendency for local food economies to internalise the costs of production and distribution. The peak oil argument raises an important point that in the near future, imported produce may become increasingly expensive as fossil fuels prices continue to rise. In this way,

citizens of the developed and developing world alike will have to look to both local and agroecological methods of acquiring food as a means of survival. A strong recommendation is therefore made to invest in a smooth transition now to local and agroecological food systems in order to avoid crisis and suffering in the near future.

"Given the degree to which the modern food system has become dependent on fossil fuels, many proposals for de-linking food and fossil fuels are likely to appear radical. However, efforts towards this end must be judged not by the degree to which they preserve the status quo, but by their likely ability to solve the fundamental challenge that will face us: the need to feed a global population of seven billion with a diminishing supply of fuels available to fertilise, plough, and irrigate fields and to harvest and transport crops" (Heinberg & Bomford, 2009:10-11).

2.4.4 Section Summary

The local food movement has been presented in the context of a growing counter movement to the modern food system. Combinations of the arguments presented above have motivated a movement towards local food systems that promote both community development and resilience. A focus on geography alone, however, will not address all the challenges currently presented by the modern food system. The potential for a local or community based approach to food systems to promote greater sustainability lies in that it is both within the interest of local communities to promote their own food, livelihood and environmental security and that they are more closely connected to the impacts of their decisions (Pretty, 2002). Local food systems encourage relationships with the food system that create an environment that tends towards responsible decision making (Feenstra, 1997:28; Hinrichs, 2003:34). The building of community networks through local food economies are put forward to have greater potential to address some of the ethical and environmental challenges currently being faced by the modern food system. A transition to a more sustainable food system would require national reprioritisation and fairer international trade as well as local reforms (described in Section 2.4.2 above).

Given that it is not in the power of individual local communities to influence global, or even national reform, it is put forward that the local food movement has resulted in the building of local food economies situated within the context of a predominantly modern global food system. In this context, local food economies are defined as the flow of resources within a network of community-based enterprises involved in the production and distribution of food at the local scale for the purposes of local consumption including, but not limited to, financial, human, social and environmental capital and refer to local food initiatives at a community level within the context of a predominantly modern food system globally. The core components and characteristics of local food

economies, as well as the benefits and limitations thereof to promote greater sustainability, will be presented in Section 2.5.

2.5 Local food economies

In this section, the core components of a local food economy are described in order to identify the key characteristics thereof. This is used as the foundation for assessing the benefits and limitations of local food economies in promoting sustainability in order to meet the first research objective.

2.5.1 Core components of local food economies

A local food economy has been defined as the flow of resources within a network of community-based enterprises involved in the production and distribution of food at the local scale for the purposes of local consumption including, but not limited to, financial, human, social and environmental capital, within the context of a predominantly unchanged modern food system.

Typical initiatives that would form part of supporting a local food economy include:

Community supported agriculture

A successful local (and typically organic) farming movement that is growing in popularity worldwide is Community Supported Agriculture (CSA). CSAs formally originated in Switzerland in the early 1970s, spreading to Japan and the USA, which now has over 1000 CSAs (in comparison to just one in 1985), (Hailwel, 2004:112). This programme differs from conventional organic box schemes in that CSA consists of a community who take collective ownership of a local farm through pledging financial support to that farm and often volunteering on the farm as well (Pretty, 2001:02; Pinkerton & Hopkins, 2009:103). The members therefore share in both the risks and benefits of food production with their local farmer and often will pay an annual membership fee at the start of the growing season to enable the farmer to purchase seeds and other resources. The members then receive a share of the produce from the farm throughout the year and the farmers in return receive better prices by selling directly to the consumer, coupled with increased financial security whilst the consumers receive better produce at reduced rates (Pinkerton & Hopkins, 2009:103).

Often local community initiatives such as these foster strong relationships between the producers and consumers, which not only reduce the environmental costs of production and distribution (such as transport, packaging etc) but also reduce the need for costly certification processes, as relationships and transactions are built on principles of trust and mutual support. Consumers benefit from the fresh and nutritious foods as well as the opportunity to reconnect with the land, the farmers that support them and the food they eat (Norberg-Hodge, Merrifield & Gorelick, 2002:15). Many of these CSA programmes also support social development projects through distribution of

food produce to poorer families in their communities. An example of a Stellenbosch based CSA is given in Box 2.

Urban agriculture

Urban agriculture is a critical aspect of local food economies (given that half of the world's population lives in cities) as well as any strategy to promote greater resilience for human settlements by increasing the volume of fresh produce being produced within urban boundaries for local consumption (Hopkins, 2000:199). Urban agriculture can take the form of backyard gardens, allotment gardening and even rooftop gardens. Intensive agriculture on small plots has been shown to make more efficient use of land and water, with indications that urban allotments can be anything between 2 – 16 times more productive than conventional commercial mechanised farms[41] (Hopkins, 2000:206). Many cities across the world are producing much of the urban food demand from within their urban boundaries, including Hong Kong (where half of the city's vegetables are grown within the urban boundary), Lusaka, Uganda (where squatters grow one third of the city's food) and Kampala, Uganda (where 70 percent of poultry and eggs are produced within the city), (Shuman, 1997:59).

"Urban centres have the highest demand for those foodstuffs which are easily perishable when transported. Thus there is a basic logic to the notion that foods should be produced as close as possible to the consumer" (Companioni *et al*., 2002:222-223). Urban agriculture is a vital coping mechanism for the urban poor (providing income in areas where unemployment is high) and an opportunity for all citizens to reconnect with the living environment, the food system that supports them and each other, through producing their own food (Pretty, 2001:04). Urban centres are also rich in labour, which is required for the production of vegetables, fruits and livestock products (Companioni *et al.*, 2002:223). Urban agriculture should be valued not only for its contribution to food security, but for the immense social benefits which include creating a central public place to gather, providing a hobby for urban citizens, an outlet for stress and a means of building dignity and empowerment (Nuss, 2004 in Halweil, 2004:11). Urban agriculture has further been found to have improved neighbourhood pride and ownership as well as initiated further community based initiatives in communities with food gardens (Armstrong, 2000:319). "By promoting urban farming, cities and their surrounding areas can be made virtually self-sufficient in perishable foods, be beautified, and have greater employment opportunities" (Rosset, 2002:xix).

Cooperatives

A movement that is well established in Japan and gaining popularity in other countries is consumer cooperatives, whereby groups of households (typically under 20) leverage bulk purchasing power

[41] Figures stated for United States production rates.

to purchase their food requirements (Hopkins, 2000:211). Most often, the cooperatives purchase directly from the farmers and thereby strengthen the local food economy by circulating more money within the local community. In Japan, over 660 producers provide food to over 11 million people through these consumer cooperatives with an annual turnover of more than US$15 billion per annum (Norberg-Hodge, Merrifield & Gorelick, 2002:16). The consumer cooperatives are as much about reducing the cost of food for the consumers as about reconnecting with food systems through farm walks, demonstrations and harvest festivals as well as weekly newsletters (Norberg-Hodge, Merrifield & Gorelick, 2002:16).

Farmer's markets

Weekly farmers' markets are growing in popularity in Europe and America as an opportunity for local consumers to purchase a range of fresh produce directly from local producers as well as to connect to their local community through the social event that it provides. It is estimated that people have ten times as many conversations at farmers' markets as in supermarkets (Sommer, Herrick & Sommer, 1981:13). Farmers' markets give consumers a greater variety of choice, but don't guarantee local farmers the sale (as are guaranteed with CSAs). As recognised by Pretty (2001:04), "where there are direct links between producers and consumers, then farmers are better able to respond to the concerns of consumers, and consumers in turn understand better the challenges and vagaries of food production."

Ethical retailers

Retailers account for a large percentage of sales (especially in the South African context) and a move towards ethical retailing that supports local produce can strongly boost the local food economy. This may be in the form of conventional retailers (typically franchise brands) that increasingly source directly from local producers or in the form of cooperative retailers whereby the members are both the shoppers and shareholders (Hopkins, 2000:211). In this way, the consumers have a direct say in what the store stocks and the profits are redistributed back into the community by the producers being paid better prices and the consumers paying less.

Local food guides, directories and other initiatives

A guide or directory of locally available food assists in supporting local food economies by increasing the awareness of local consumers on the range and diversity of locally produced food available in their community. Many local communities have compiled local food guides or directories that also promote seasonal produce and assist local consumers in accessing local producers more directly. Other initiatives associated with local food economies include local food events (such as harvest festivals and celebration days), educational school programmes around local food and outreach programmes that link youth and special needs groups with the outdoors

through food gardening experiences (Pinkerton & Hopkins, 2009). Local food economies are often also supported by community banks and local currencies that keep money circulated locally and the revenues distributed to the community (Norberg-Hodge, Merrifield & Gorelick, 2002:41).

2.5.2 Key characteristics of local food economies

From a review of core components that support a local food economy, key characteristics of a local food economy include:

(i) *Localisation of production*: local food produce is produced within the local foodshed for the purposes of local consumption. The circulation of resources within the local context is therefore both the food itself and the nutrients used in the production of the food as well as payment for the food (Norberg-Hodge, Merrifield & Gorelick, 2002).

(ii) *Localisation of the entire value chain*: from seed and compost production through to value adding and beneficiation, whole value chains can be localised thereby stimulating the local economy further (Shuman, 1997:52).

(iii) *Networks of diversified and smaller farms:* farms producing for local consumption are typically more diversified and concentrated in the production of food. “As the economy became more local, local farming would become more diverse; the farms would become smaller, more complex in structure, more productive” (Berry, 1993:25-26). Diversification is associated with production for locally orientated markets and reducing risk of individual crop failures (Altieri, 2002b:xii-xiii). Diversified farms are typically more productive per square meter (Rosset, 1999; Halweil, 2004:75), and tend towards agroecological methods of production (Pretty, 1998:197-198; Hinrichs, 2003:35), (discussed further in Section 2.5.3 below).

(iv) *Innovative use of space & resources*: local food production is not limited to conventional farms or agricultural zones and is associated with making productive use of urban and peri-urban zones as well (Companioni *et al.,* 2002).

(v) *More direct connection between producer and consumer:* a key characteristic of local food economies is the relationship established between producers and consumers who engage more directly through their local food system (Marsden & Smith, 2005:442; Seyang, 2006:396).

(vi) *Focus on fresh produce*: local producers are associated with primary production of a diverse range of fresh produce ranging from vegetables, fruit, nuts and cereals to meat, milk and eggs (Companioni *et al.,* 2002:225) which has implications for increasing access to nutritional fresh produce for local consumers’ part of the local food economy.

(vii) *Seasonal eating*: local food systems tend to promote the eating of seasonal produce that are adapted to local climates (Norberg-Hodge, Merrifield & Gorelick, 2002:51).

(viii) *Internalisation of social and environmental costs*: the price of produce sold through local food economies may be higher than food from the conventional food system as the price tends to internalise more of the social and environmental costs of production (Peters *et al.,* 2008:01-02). Farmers typically receive a greater share of the food dollar and organically grown food is more affordable than if bought from conventional retailers (Francis *et al*., 2008:92). Implications of cost are discussed further in Sections 2.5.3 and 2.5.4.

2.5.3 Benefits of local food economies in promoting sustainability

There are several ways in which local food economies (operating within the context of the modern food system) can be shown to promote sustainability at a community level. These are described broadly according to the benefits for different actors in the local food system.

Small-scale farmers

Local food economies are often more favourable for small-scale farmers who have been established as critical in promoting livelihood and food security for the wider population, in Section 2.3.2 (Pretty, 1998:197; Rosset, 1999; Halweil, 2004:75). Small-scale farms are better suited to participating in local food economies, given their capacity to grow a diverse range of fresh produce and their potential for adaptability to local preferences (Seyfang, 2006:396; King, 2008:01). Local food economies allow small-scale farmers opportunities to sell their produce more directly to local consumers, thereby reducing costs of transport as well as the share of the food dollar typically lost to middle men (who are typically not part of the local economy). Most importantly, farmers receive a higher share of the food dollar which is recirculated through the local economy as they support other local enterprises (Singer & Mason, 2006; Francis *et al*., 2008:92). Through a relationship with their consumers, farmers are more likely to have secure social contracts that guarantee their customer base (Francis *et al*., 2008:92). “A sense of shared ownership of community resources and the responsibility for its viability and preservation, ‘can inspire trust and commitment, effectively lowering transaction costs and facilitating the process of economic interaction’; without marginalising social and environmental capital” (Ekins, 1997:19 in Marsden & Smith, 2005:442).

Supporting enterprises

There are several opportunities for stimulating the local economy beyond supporting local farmers. Local livelihood security of the wider community can be promoted with the production of farm inputs and micro-enterprises, supporting local distribution through to value adding industries associated with the food sector (Shuman, 1997:53). Processing and packaging enterprises that have previously been located elsewhere can be established in local foodsheds, thereby stimulating local enterprises further (Shuman, 1997:52). “Locally and regionally produced food offers greater

security, as well as synergistic linkages to promote local economic development" (Rosset, 2002:xix).

The multiplier effect of localising the food system both stimulates the local economy and builds resilience. A recent study by Sonntag (2008) found that "locally directed spending by consumers more than doubles the number of dollars circulating among businesses in the community" (Sonntag, 2008:v). Research by Ward and Lewis (2002:20) found that for every £10 pounds spent with a local producer through an organic box scheme, the money was circulated within the local economy to make a total contribution of £25 to the local economy (in comparison with a worth of £14 to the local economy if spent at a local supermarket). In this way, money spent on locally produced food generates twice as much income for the local economy (New Economics Foundation, 2001) and promotes stronger social cohesion for the entire local community (Taylor, Madrick & Collin, 2005:01).

Local economies tend to address inequalities of wealth by spreading their gains evenly through the entire community whereby "improving the economic welfare of farmers, farm workers, small producers and shopkeepers benefits entire local economies, providing in turn deep social benefits to communities as a whole" (Norberg-Hodge, Merrifield & Gorelick, 2002:31). A study by Goldschmidt in the 1940s of two similar sized towns in rural California found that the town surrounded by small family farms supported twice as many businesses and generated more than 60 percent retail volume than the industrial farm town, including a range of secondary industries and supporting community enterprises (Norberg-Hodge, Merrifield & Gorelick, 2002:31). "Local economic development therefore can provide an effective counterforce against economic, political and social vulnerability due to the forces of global competition" (Marsden & Smith, 2005:442).

Consumers

Consumers stand to benefit from increased availability of fresh produce within their own community and the food security of the entire community is increased by removing dependency on imported produce. Whilst local food economies often realise better pay for local farmers, this may or may not translate into cheaper prices for consumers[42]. Local food competing with cheaper, imported food (produced with modern agricultural methods and often subsidised) may be more expensive. However, local organic food is often cheaper than retailed organic food in local food systems[43] (Francis *et al*., 2008:92). The price of locally grown produce varies greatly from situation to

[42] "There is strong evidence that local food often costs less than the equivalent food brought on the international market or from a supermarket, because transportation costs are lower and there are fewer middlemen" (Halweil, 2004:18).

[43] Food purchased through local farmers' markets and local food delivery schemes in southwest England offered greater variety and was found to be 30 – 40 percent cheaper than similar quality products from the local supermarket (Foundation for Local Food Initiatives, 2002).

situation, but a key feature is the tendency to internalise social and environmental costs. Paying appropriate prices for food which ensures fair payment to the food producers, and respect of the natural environment supporting life, is critical for the long term sustainability of the human population. In the upcoming context of the end of cheap oil and carbon taxation, food produced through fossil fuel intensive methods will be increasingly more expensive and local food increasingly more viable for all (Peters *et al.,* 2008:02).

Local food economies are not limited to the sale of food alone but include activities to grow food in community supported initiatives, such as community food gardens, which allow the members of a community who are not able to afford the potentially more expensive local food (given that the costs of production have been internalised), access to fresh and nutritious food (Companioni *et al.*, 2002:223). An important and often difficult to measure benefit from local food economies is the value of reconnecting with the natural environment and local community through local food initiatives (Pinkerton & Hopkins, 2009:29). Nature deficit disorder (commonly referred to in children who are increasingly disconnected from the natural world) results not only in poor physical conditions but impacts on mental and spiritual wellbeing as well, and is an increasing concern for both urban and rural residents alike (Louv, 2007). Children connected to their food systems and natural environments arguably have stronger self-esteem and healthier identities (Norberg-Hodge, 2009b:05). Local food economies have important roles to play in building community connections as well. "Not only does an adequate, varied diet contribute to individual health, but the way food is grown, distributed and eaten also profoundly affects the environmental, social, spiritual and economic well-being of the community" (Feenstra, 1997:28).

> *"That good taste was satisfaction. The time I spent getting the food and preparing it was not, in the end, a cost at all. In the end it was a benefit, the benefit. In my role as an eater, I was part of something larger than myself that made sense to me – a community. I felt grounded, connected" (McKibben, 2007:94).*

"Direct agricultural markets promise human connection at the place where production and consumption of food converge, an experience not available either to consumers shopping at 'superstores' or 'hypermarkets' or to farmers selling through conventional wholesale commodity markets" (Hinrichs, 2000:295). Seyang (2006:396) refers to the social embeddedness of local food economies that develops "connections between consumers and growers, boosting ethical capital and social capital around food supply chains, educating consumers about the source of their food and the impacts of different production methods, creating feedback mechanisms which are absent when food comes from distant origins, and strengthening local economies and markets against disruptive external forces of globalisation". The social relation of connectedness between producers and consumers is likely to give rise to improved management of environmental

resources – forging a “geography of regard” (Sage, 2001 in Hinrichs, 2003:36) that is not devoid of its own shortcomings, but which allows space for increased autonomy, accountability and democracy.

A further argument presented in support of local food economies is that when food is no longer grown for characteristics favouring long distance travel and refrigeration, the taste and nutrition of the food can rather be the focus of production. Consumers tend to associate local with ‘freshness’ and ‘taste’, and cite this as an important motivator for purchasing locally (IGD, 2006:40). A recent survey of consumers’ perceptions of local food in Finland found that support of local food was “related to supporting the local farmers and the local economy, freshness and knowing where their food was coming from” (Roininen, Arvola & Lahteenmaki, 2006:28).

Building a healthy local food economy (from local farmers to community food gardens) will go a long way towards increasing the contribution of fresh produce to our diets and thereby starting to address some of the challenges around food security (in terms of both under- and over-nutrition) facing our global society. “Some nutritionists have even determined that the best nutrition of all comes from foods that are in season in one’s locale” (Norberg-Hodge, Merrifield & Gorelick, 2002:51). Fresh organic vegetables are estimated to be on average ten times more nutritious than vegetables purchased from conventional supermarkets (Norberg-Hodge, 2009:03). Local food systems are also considered to decrease food safety risks through the decentralisation of food production (Gussow, 1999 in Peters *et al*., 2008:03).

Local food economies are shown to be central in building local democracy and decision making systems by shifting power back to communities, which reinforces the resilience of local communities (Shuman, 1997:78). Engaging with a local food economy has shown an increase in awareness by consumers of a range of sustainability issues, from the importance of supporting local communities through to the value of the natural environment. “The supportive relationship between farms and the community helps to create an on-going learning relationship which increases consumers’ awareness about the implication of producing food that meets certain criteria (e.g., seasonality, choices in management practices, cost or production) and increases farmers awareness about consumers’ preferences: that is, the relationship enables purposeful feedback and adaptation” (King, 2008:01) and a responsive food system that is adapted to local conditions and needs. Local consumers often progress to supporting organic food as well as start engaging with other sustainability orientated practices such as backyard nutrient recycling (or composting), ethical purchasing and reducing their carbon footprints more holistically. An important argument in support of local food economies is that communities connected more directly with the impacts of their food systems are more likely to support environmentally sustainable methods of production. A

critical component of education for children is learning through farm experiences on the interconnectedness of all living systems, and the importance of sustainable food production (Halweil, 2004:174).

On a review of social embeddedness[44] in CSAs and farmers' markets, Hinrichs (2006:300) concluded that CSAs "move towards decommodifying food through the special transaction of the share and through its explicit emphasis on community" and highlight how shared experiences and ventures offer one of the best opportunities for building both community and the local economy through food. And whilst "economic behavior is embedded in and mediated by a complex, often extensive web of social relations" (Hinrichs, 2000:296), the economics of price and quality will always play a critical role in the functioning of any local food economy.

"Recognising how social embeddedness is qualified to marketness and instrumentalism is critical for understanding the viability, development and outcomes of local food systems. If direct agricultural markets are to become sound, transformative alternatives, sentimental assumptions about face-to-face ties must be tempered. Social ties, personal connections, and community good will are often appropriately seasoned by self-interest and a clear view of prices. It is true that too much instrumentalism and marketness can sour the embedded market. But a dash of instrumentalism and marketness well ensure a more substantial, nourishing meal" (Hinrichs, 2000:301).

The supporting natural environment

A key aspect of local food economies, beyond building community resilience through strengthening the local economy and social networks, is the potential for promoting increased environmental sustainability through the localisation of the food system. The most published finding is the potential for reduction in embodied energy associated with the localisation of food production and distribution. Reducing the distance that food travels unnecessarily offers important savings in the total contribution of the food system to greenhouse gas emissions. The food miles argument presents one aspect of the total energy embodied in production but, as has been described, investigation into both what is being produced and methods of production are almost of more importance. Embodied energy can further be reduced by other characteristics associated with local food economies including reduced refrigeration (produce is typically picked on the day of sale) and packaging (as consumers receive produce more directly from the farmers and do not require excessive packaging).

It appears that the greatest reductions in contributions to climate change, as well as other environmental challenges, stand to be made from changes of on-farm practices. Research by

[44] Where social embeddedness infers "social connection, reciprocity and trust" (Hinrichs, 2000:296)

Pretty (2001:07) suggests that the greatest externalities of the modern food system lie in on-farm practices (i.e., the impact on the environment is greater on-farm than as a result of international transport). In this context, the links between local and the tendency towards agroecological production and ethical consumption become increasingly important.

Local food economies rest on producers being able to grow a diversity of fresh produce for local consumption which typically takes place on smaller and more concentrated farms[45]. Agroecologically grown produce requires stronger supporting agricultural knowledge systems but less external inputs, which in the context of peak oil, is a key feature of local food economies. Furthermore, "organic farming fits directly into local food systems. Consumers are looking for fresh, high quality, good tasting produce" (Francis *et al*., 2008:92). Consumers who actively support local food economies are typically also supportive of agroecological and environmentally sound methods of production. Experiences with local food movements have shown that as consumers become increasingly connected with their food system and the associated impacts thereof, they actively seek healthier and environmentally friendlier food as well (Hinrichs, 2003:36). Agroecological methods of production reduce dependency of farmers on increasingly expensive external inputs and improve the long term sustainability of their farming enterprise by building the integrity of the supporting natural environment (Pretty, 2001:07; Peters *et al.,* 2008:02). In this way, local and organic is to the benefit of the small-scale farmer as well. A characteristic of local food economies is the support of a wider diversity of crops contributing to investment in the integrity of supporting ecosystems critical for building strong local foodsheds. The environmental benefits of agroecological approaches often linked to local food systems are numerous, and include the protection of watersheds, encouraging biodiversity and enhancing wildlife habitats (Francis *et al*., 2008:92).

Furthermore, local food economies are associated with a reduction in waste through the reduction of packaging. The understanding between producer and consumer allows the producer to sell produce that does not conform to typical retail standards and thereby reduce food waste of products that would otherwise not be considered fit for retail sale. For example, farmers wanting to sell zucchinis to pack sheds to be sent to distribution warehouses to be sold at supermarkets need to ensure that the zucchinis are within a very limited length range so that they can fit in the standard styrofoam packaging. These standards can often be prohibitive for small-scale farmers who grow with agroecological methods (Reardon *et al*, 2002 in Pimbert, 2008:20).

Local food economies further encourage the recycling of nutrients within the local system. Kitchen waste becomes a nutrient input for backyard and urban food gardens whilst smaller farms

[45] "Small-scale, 'local' farmers are not inherently better environmental stewards, although having fewer acres or stock to care for may make this more likely" (Hinrichs, 2003:35).

associated with local food systems are better suited to the recycling of nutrients on farm through the diversified range of activities they are engaged in and by adopting a closed loop or systems approach to the entire local food economy (Norberg-Hodge, Merrifield & Gorelick, 2002:33). This overcomes some of the major environmental challenges associated with the modern food system, such as the waste produced by concentrated animal farm operations or the need for bringing in high external inputs to replenish nutrients (Halweil, 2004:39).

Conclusions

The links between local food economies and promoting community development through supporting local farmers, the wider economy, consumers and the natural environment are complex and multidimensional. The argument presented is not that local food economies will ensure the sustainability of an entire community but rather that building local food economies has several benefits in promoting sustainability at a community level. Local food economies have a vital role to play in protecting communities from the "whims of international markets" (Halweil, 2004:54) and building the overall resilience of local communities through diversification of the food system, strengthening local decision making processes and building natural, social and economic capital (Pinkerton & Hopkins, 2009:33). Of critical importance to support the fostering of local food economies is the building of local knowledge systems, raising awareness and building systems of support to assist local communities. "Reductionist natural science cannot resolve the local food debate, as for many consumers the attractions of local food do not relate to measureable differences in its embodied energy or nutrient status, but rather they relate to a sense of place, trust and experience" (Edwards-Jones *et al*., 2008:272). "We need to understand the complex meanings and significations attached to acts of consumption so as to avoid false dichotomies between globalised food systems and alternative consumption practices" (Winter, 2003:31).

"'Local' then becomes potentially a social space (*a place to share some form of disconnection*) for the re-assembling of resources and of value; a place for evolving new commodity frameworks and networks; a place of defence from the devalorisation of conventional production systems" (Marsden & Smith, 2005:442). Despite these multiple benefits, local food economies experience multiple limitations given that they are currently operating in direct opposition to the mainstream modern food system that has successfully externalised most social and environmental costs from food systems globally and has been heavily subsidised in achieving this. Some of the limitations of local food economies in promoting sustainability will be presented in Section 2.5.4 below.

2.5.4 Limitations of local food economies in promoting sustainability

There are certain limitations of local food economies in promoting sustainability, and these are reviewed with respect to limitations of local food economies to meet all food requirements for a

local community, environments which may not be suitable for promoting local food economies and short term limitations associated with local food economies in the context of the predominantly modern food system.

Limited productive capacity

A local food economy will most likely not be able to supply all the food requirements for a community from within their local foodshed and will still rely on certain imported produce depending on the suitability of the region to production and consumption patterns of the local population. Many communities have settled in unsuitable environments for crop production or become used to the year round availability of produce from a range of climatic zones, both enabled by the global nature of the modern food system. There is an "unavoidable tension between the human enjoyment of variety and the global homogenization of food" and whilst the globalisation of the food system has enabled greater availability of food from different regions all year round, it is simultaneously undermining agricultural diversity (explained in Section 2.3.4) and entrenching dependency on externally produced food (Halweil, 2004:13). As recognised by Shuman (1997), "the variety of these well travelled goods certainly enhances the quality of our lives, but our growing dependence on them carries profound risks. The more essential the item is for our survival, the more dangerous it is to depend on someone outside the community selling it to us" (Shuman, 1997:52).

Experiences by various families have shown that it is possible to survive for a year on locally produced food even in cold winter climates (McKibben, 2007; Kingsolver, Hopp & Kingsolver, 2007) but requires thought over convenience. The authors were happier for the experience (citing a stronger bond to their local community, more natural and nutritious meals and overall enjoyment as motivations) and survived the cold winters with some careful planning such as canning and freezing from the summer harvest (McKibben, 2007; Kingsolver, Hopp & Kingsolver, 2007).

It is important to recognise that local food economies do not limit consumers to only eating locally produced food but rather encourages local resilience and reduced dependency by producing local crops that are suitable to the region where possible. Certain regions are not suitable for growing certain crop types due to environmental resource constraints (such as rice crops in arid regions) and raises questions about shifting diets to suit local conditions as well as issues of trading embodied energy and water. Ideally prices of imported produce should reflect the associated environmental and social costs of global trade. In the context of the modern food system which is characterised by unfair global trade, a severe limitation of local food economies is the inability to compete with cheap and subsidised imported produce. For example, a local farmer growing a local variety of apples in South America may still compete with subsidised apples from a commercial

farm in America. Strong community bonds and awareness raising, coupled with community food garden initiatives to ensure equal access to fresh produce for all, have important roles to play in overcoming some of these challenges.

A further argument is presented against local food economies as the redirection of support away from export orientated countries reliant on export of food produce for local development. The case of Kenyan bean farmers is often cited and the argument is sometimes coupled with the case for supporting coffee, banana or macadamia farmers whose products are considered non-essential luxury items (McKibben, 2007). Export agriculture in many developing countries does form a critical part of their economies, yet many remain in poverty and more so than decades before, as a result of unfair global trade (Fafchamps, 1992:90). Resolving these challenges would start with a fairer system of global trade, accounting for the true costs of production (socially and environmentally, including offsetting for international travel) of the 'luxuries' in life that we take for granted and distortedly seem to pin our survival on. A shift towards local food economies would not detrimentally impact developing nations currently dependent on export products but rather serve to increase their local resilience through a focus on crops to meet local demand first and strengthening local economies (Fafchamps, 1992:98; Norberg-Hodge, Merrifield & Gorelick, 2002:43).

Limited reduction of carbon footprint

It is also important to recognise that a transition to supporting locally grown food will not necessarily translate into a drastically reduced carbon footprint. As highlighted through the discussions above, accounting for what is produced and the manner in which it is produced can often be more important than the distance that food is transported. Local food economies can promote greater awareness through stronger community bonds and accountability on these issues, but will not guarantee a drastic reduction in the carbon footprint associated with food production and distribution. Reducing unnecessary transport distances in favour of building local resilience can contribute to reducing contributions to climate change as well as fostering stronger communities.

Limited suitability of certain environments

Environments which may not be considered viable for promoting local food economies include:

(i) *Extreme climates*: such as extremely cold or hot regions, regions with water scarcity or regions experiencing changes in weather conditions as a result of climate change (Halweil, 2004:88). Human settlement in these regions may remain dependent on imported produce.

(ii) *Severely degraded ecosystems*: especially regions with poorly degraded soils. Agroecological methods of production are critical for rebuilding the integrity of soil in such conditions (Pretty, 1995).
(iii) *Conflict zones*: where local democracy and decision making processes are compromised.
(iv) *Restricted access to land*: without fair and equal access to land (even limited urban spaces), the productive potential of a local food economy is severely limited.

Ultimately, local food economies will vary from region to region. "Local foods tend to differ from place to place, in direct relation to differences in climate, geography and natural resources. Similarly, local food production involves a wide range of cultivation methods, as each locale's unique ecological and cultural conditions are allowed to determine appropriate farming practices" (Norberg-Hodge, Merrifield & Gorelick, 2002:17).

The benefits and limitations of local food economies in promoting sustainability are perhaps best explored and summarised through one of the few case studies of a truly local focussed food economy. The Cuban experience of local food economies is given in Box 1 below.

Box 1: The Cuban Experience

The Cuban experience of localising the food system highlights many of the benefits of local food economies, as well as some of the limitations. Trade embargos from the USA coupled with the collapse of the Soviet Union in 1991 left the island nation of Cuba without a reliable supply of fossil fuels and imported food as well as agrochemicals and farm machinery, yields fell dramatically and the country experienced a food crisis for several years during what was referred to as the *Special Period in Peacetime* (Rosset, 2002:xvi). "Cuba was forced to turn inward, toward its own natural and human resources, and top both old and new ways to boost production of basic foods without relying on imports" (Rosset, 2002:xiv). Food security was declared a national priority (Nieto & Delgado, 2002:40; Levins, 2002:278). Other priorities relating to the agricultural sector and food production included economic solvency (focussing on economies aimed at social development and security rather than profit maximisation) and protection of health (Levins, 2002:278). The government invested heavily into local food production to combat food shortages premised on organic methods of production, including massive urban agriculture programmes (Duenas *et al*., 2009:31). Major changes in the structure of Cuba's food system as it localised include the "diversification of channels of food distribution, and the greater variety of income sources for the population" (Nieto & Delgado, 2002:48).

“The ecological transformation of Cuban agriculture since the early 1990s is overwhelmingly complex, including changes in agrotechnology, land tenure and use, social organisation of production and research, education programmes and financial structures” (Levins, 2002:279). Food security has been promoted through self provisioning programmes (in home gardens, backyards or cooperatives) as well as the availability of basic food produce at cost (Nieto & Delgado, 2002:48). More vulnerable groups (such as children, pregnant women and the elderly) are monitored and assisted with special programmes (Nieto & Delgado, 2002:49) and food directed to those most in need (e.g., when milk was in short supply, it was prioritised for children first), (Levins, 2002:278).

Urban agriculture in Cuba has been a major part of the agricultural movement with a strong focus on the productive use of space for food security. The core principles of urban agriculture in Cuba, as identified by Companioni *et al*. (2002:220), include “organic methods, which do not contaminate the environment; the rational use of local resources; and the direct marketing of produce to consumers”. The government invested heavily into urban agriculture whereby “an extensive network was built up for the provision of training courses and extension services, and the distribution of seeds and tools” (Duenas *et al.,* 2009:31). The production methods varied from raised beds and balcony gardens to intensely concentrated hydroponic farms and other specialised systems, in total creating over 160 000 jobs for people from a variety of backgrounds (Companioni *et al*., 2002:221). An estimated 90 percent of fresh produce consumed in Havana was being produced in and around the city by 2002 (Companioni *et al*., 2002:235). Today there are an estimated 350 000 ‘urban farmers’ growing crops on over 700 000 hectares, with production from cities increasing from 4000 tonnes per annum in 1994 to over 400 000 tonnes in the first three months of 2009 (Duenas *et al*., 2009:31).

Through concentrating on low external input production in the absence of cheap oil, Cuba has created “highly efficient organic systems” (Duenas *et al*., 2009:31), ensured food security and created jobs - showing to the world the possibility of producing sufficient food in a low carbon future.

Figure 9 below highlights how today Cuba is the only country in the world that is living within the world’s biocapacity and simultaneously promotes a high quality of life. “What if economic development is not a goal in itself but a means to enriching life and preserving nature, with emphasis on equity, health, education, culture, recreation, and mutual caring in an environment which is sustainable, diverse and people friendly? That is the unique path that Cuba has

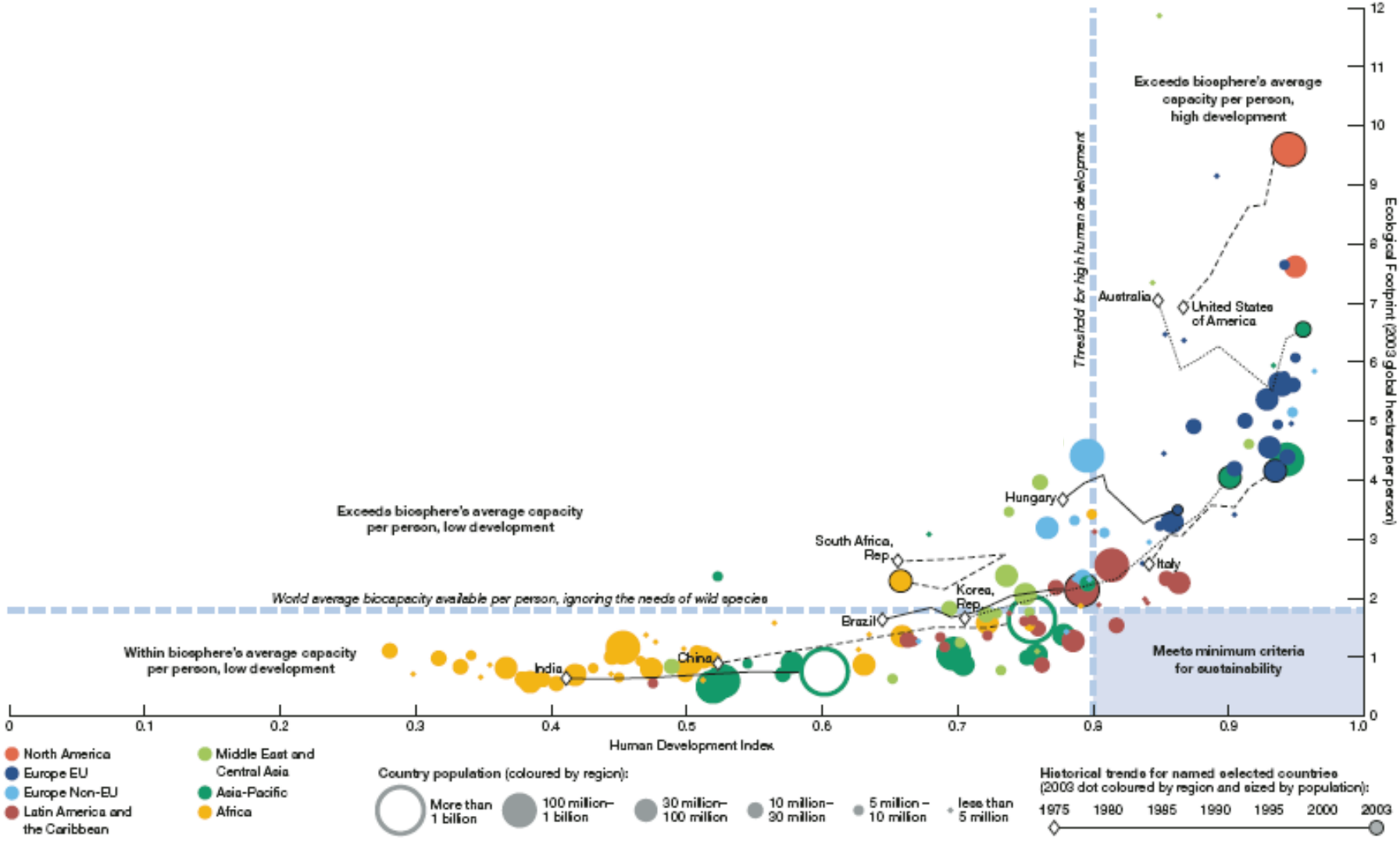


Figure 9: Human Development and Ecological Footprints, 2003

Source: WWF, 2006

2.5.5 Section Summary

Local food economies based on principles of agroecological production, environmentally sensitive and ethical distribution and nutritional consumption have tremendous potential to promote sustainability for local communities in the context of a predominantly modern food system. “Such innovative regional and local forms of development need to be seen in the context of two major countervailing forces, within which local ‘value-capture’ has to fit: globalisation and agrarian (agro-industrial) modernisation” (Marsden & Smith, 2005:441). As recognised by Sonntag (2008), “what we are witnessing in the emergence of the local food economy is changing the idea of what makes for healthy economies – from growth based on commoditizing resources to community stewardship of resource flows” (Sonntag, 2008:v).

There are several limitations of local food economies, including the limited capacity of many foodsheds to provide all food types, the inability of local food producers to compete with cheap imported produce and the unsuitability of certain geographic and political contexts to realise a healthy local food economy. Measures can and should be taken to reconsider patterns of human settlement that have been enabled by distorted global trade and access to cheap fossil fuels. Addressing issues of democracy, stability and environmental security remain critical to human development in the broader context as well as for promoting stronger food systems.

2.6 Chapter summary

In the context of the current global polycrisis and the impacts of the modern food system, there is a clear need for more ethical and environmentally sustainable food systems. Building local food economies has been shown to have numerous benefits in promoting greater sustainability, but needs to be supported by fairer allocation of land and access to markets, agroecological methods of production and the building of agricultural knowledge systems and supporting networks. There is a growing counter movement to the modern food system of communities actively supporting local food economies in the transition towards sustainable development. Yet, “despite the many advantages of a more intimate food chain, change will not come easily” as a result of the increasing control of large corporations over the global food system (Halweil, 2004:18) and global policy that remains firmly against locally resilient communities (Norberg-Hodge, Merrifield & Gorelick, 2002:10).

In the context of limited non-renewable resources, the rising price of fuel and shifting global market forces, Shuman (1997:53) argues that the most competitive communities may not be the largest, but rather the smartest and most innovative. Rising food prices and global economic insecurity coupled with increasing environmental degradation are certainly drivers which may lead us to

considering more seriously local food movements premised on agroecological production and building social capital as a viable alternative to the current modern food system (Peters *et al.,* 2008:02). Just as Cuba was able to innovate localised agricultural systems in response to oil shortages, so too will many more nations need to look towards food sovereignty in response to growing global pressures on the fundamental right to sufficient nutrition (Funes *et al.*, 2002). As was highlighted, Cuba is also the only country with an acceptable human development index that lives within the planet's biocapacity. This highlights important lessons for South Africa - one of the only countries living beyond the world's biocapacity and below the threshold for human development (WWF, 2006:19) as highlighted in

Figure 9.

Whilst forces of globalisation at times seem unstoppable, it is the consumers who in the end choose whether or not to purchase a product and thereby support certain methods of food production and distribution. Consumers can choose to support locally produced products which adhere to standards of fair production and trade, as well as ecologically sound principles. Consumers may make these choices as an investment in their personal health or as a value-driven purchasing decision to support a more ethical and sustainable system of food production, or both. Decisions made by consumers to support their local communities in this way also serve to strengthen the fabric of their community whilst regaining control over our food systems that sustain us.

Ultimately, localisation is about relationships with food production and distribution systems and with food itself. Building vibrant local food economies will rest on working towards what is most sustainable in the local context, meaning not just in terms of carbon footprints or the broader environment, but the very fibre of our social systems as well. In the context of the end of cheap oil, local food economies may soon become the standard and not the exception. The key finding of this literature review suggests that local food economies tend to promote greater sustainability by empowering local communities to take greater control of their own food systems, thereby strengthening social capital, stimulating local economies and providing opportunities for improving environmental security and ultimately increasing the overall resilience of the community as a whole.

Chapter Three: Research Design and Methodology

3.1 Introduction

The purpose of Chapter Three in outlining the research design, methodology and process is to motivate the research approach that was taken and contextualise the research findings given in Chapter Four. Given the complexity of the research case study (local food economies in Stellenbosch), the research design was built on several research methodologies, both empirical and non-empirical, in an attempt to provide a more holistic and multi-dimensional perspective to the research findings. This approach is informed by a sustainable development perspective (Bartelmus, 1994; Mebratu, 1998; Gallopin, 2003:07) which places strong emphasis on the importance of both quantitative and qualitative understandings of complex systems (Clayton and Radcliffe, 1996:01-27; Harding, 2009:35).

A summary of the ideal research approach, the actual approach taken within the limits of the study and the research outcomes as well as opportunities for further scholarship are presented in Table 2 in the Chapter Summary (Section 3.4).

3.2 Research design

The research design aimed to meet the research objectives which have been outlined as:

i. to investigate the benefits and limitations of local food economies in promoting sustainability
ii. to build an understanding of the current status of local food production, distribution and consumption in Stellenbosch
iii. to recommend measures which can be taken to promote greater sustainability through Stellenbosch's food system

A literature review was selected as the most appropriate means of investigating and establishing the benefits and limitations of local food economies in promoting sustainability and thereby meeting the first research objective, outlined in (i) above. The aim of the literature review is to provide a sound theoretical understanding of sustainable development and the modern food system against which to assess the benefits and limitations of local food economies in promoting sustainability. The findings also informed the research sourced in meeting the second research objective and the

recommendations made in meeting the third research objective. The research process and methodologies employed for the literature review are outlined in detail in Section 3.3.1 below.

Based on the findings of the first research objective (that local food economies tend to promote greater sustainability), a core finding from the literature review was to promote stronger local food economies in Stellenbosch. The next objective of the research (refer to (ii) above) was to build an understanding of the current status of food production, distribution and consumption trends in Stellenbosch in order to make recommendations to promote sustainability through Stellenbosch's food system (and meet the final research objective (iii)). This would require being able to compare current production with current consumption in order to establish whether Stellenbosch had the capacity to localise its food system and meet local consumption demands through local production (i.e., what is currently being produced). This was further compared with nutritionally optimal consumption[46] based on high levels of food insecurity that were recorded for the region (Khoza, Troskie and Jacobs, 2009:102; van Niekerk, 2009). The final aspect was then to compare current and nutritionally optimal consumption with potential productive capacity (i.e., what could be produced) in order to inform the recommendations presented in support of the final research objective.

Secondary data analysis (SDA) was selected as the primary research design to build an understanding of the status of Stellenbosch's food system. SDA is defined as ""using existing data (mostly quantitative), ... [and] aims at reanalysing such data in order to test hypotheses or to validate models" (Mouton, 2001:164). The secondary data used in the research included census data, survey data and market analyses. The strength of the research design is that it allows a large body of extensive and often thorough data to be analysed but it does limit the study in that errors and constraints of the original research are carried through (Mouton, 2001:165; Boslaugh, 2007:03-04).

The research also drew on ongoing discussions (both formal and informal) with local farmers, local retailers (from community supported agriculture programmes, local markets and commercial retailers) and the local municipality, given their direct role in the research topic area. Discussions were also conducted with individuals involved in local food initiatives in order to better understand the benefits and limitations of local food economy experiences in the reality of the Stellenbosch context. The aim of the research was to establish current practices, challenges and opportunities for promoting localisation of the food economy given the value of local food economies in promoting sustainability as established in Chapter Two through the first research objective. The

[46] Nutritionally optimal consumption refers to the consumption demands for the region that would promote optimal nutrition and described further in Section **Error! Reference source not found.**.

research processes and methodologies employed to meet the second research objective are detailed in Sections 3.3.2 and 3.3.3 below.

The final objective of the research, refer to (iii) above, was to provide recommendations for promoting sustainability through Stellenbosch's food system. The recommendations that have been made (presented in Chapter Five, Section 5.3) are based on the outcomes of the literature review, the data collected and interviews conducted as well as personal observations both during and prior to the research period.

3.3 Research methodology and process

In order to meet the research objectives as outlined above, three research design types were employed and the research processes that followed are described in detail below. The research processes undertaken are described, including the methodologies employed and justification for the choices made as well as considerations taken about alternatives methodologies. The research processes are summarised in Table 2 in Section 3.4.

3.3.1 Literature review methodology

The purpose of the literature review was to provide a sound theoretical framework that could be used to investigate the benefits and limitations of local food economies in promoting sustainability and thereby meet the first research objective (stated above in Section 3.2, i). A literature review can be defined as a research design type that "provides an overview of scholarship in a certain discipline through an analysis of trends and debates" (Mouton, 2001:179).

This theoretical framework was built by undertaking a literature review that would (1) provide a context for the need for sustainable development through a review of current global crises, (2) develop a sound definition of sustainable development and sustainability and (3) review the functioning and impacts of the modern food system that would provide the context for emerging alternative food movements, including the (4) local food movement which is then traced from origin to current functioning and core characteristics. This theoretical framework then provided a foundation from which to (5) assess the benefits and limitations of local food economies to promote sustainability.

A series of key internationally accepted reports were taken as the departure point for building an argument for sustainable development through a review of the current global polycrisis and included the United Nation's Development Programme's Human Development Report from 1998 (signalling a shift in global focus beyond poverty into issues of inequality as well) and the 2003 UN-HABITAT Report on the Challenge of Slums (critical in identifying the scope and magnitude of growing urban poverty). Key reports in assessing the state of the natural environment included the

Millennium Ecosystem Assessment Report of 2005 (which drew on over 1300 scientists globally to "assess the consequences of ecosystem change for human wellbeing" (MA, 2005:v)) and the World Wildlife Fund's Living Planet Reports for 2006 and 2008 (WWF, 2006; WWF; 2008).

Further key reports included the Intergovernmental Panel on Climate Change (IPCC) findings on climate change in 2007, the Stern Report by Sir Nicholas Stern (commissioned by the British government to assess the costs of climate change globally). a growing body of literature around peak oil led by Campbell of the Oil Depletion Analysis Centre (Edwards, 1997:1292; Bentley, 2002:189; Campbell, 2002) and the international recognition of the end of cheap oil by the International Energy Agency in 2008 (IEA, 2008:14). A key report drawn on for the review of the modern food system included the findings of the IAASTD[47], which can be considered a comprehensive global review of the state of agriculture, being compiled by 400 scientists through a peer reviewed process and reviewed by 30 governments and 30 civil society organisations.

The first search criteria for investigating the local food movement was set to *local food economy* literature based on Stellenbosch or South African experiences. Searching both online databases and contacting several departments at the University of Stellenbosch (as well as meeting with several subject librarians at the University Library) revealed that very limited literature was available on local food experiences in South Africa in general apart from limited case studies in international texts and none were found for Stellenbosch in specific.

The search criteria were then widened to include *local food systems* in the international context. The majority of findings from searching online databases focussed on the food miles debate and carbon footprinting of transport costs, in some cases extending to analysis of the carbon footprint for the entire product lifecycle (Edward-Jones *et al*., 2008:265). The predominant finding from these case studies (with the results varying greatly) was the importance of locality and context in each example (Peters *et al*., 2008:03). The literature on food miles and carbon life cycle assessment was felt to fall short of addressing the complexity of the food systems by focussing only on embodied energy. It was increasingly found that literature analysing a rich diversity of impacts of local food systems considered the flow of multiple types of resources within a local food system, often being termed the 'local food economy'. Within the local food economy literature, new perspectives that were not considered at the formulation of the research title were uncovered, including the links between local and agroecological methods of farming and local and building community resilience on multiple levels. Principle authors whose work dominated the local food economy literature and were continuously referred to in other case studies included Feenstra

[47] The IAASTD is "an international assessment of the role of agricultural knowledge, science and technology (AKST) in reducing hunger and poverty, improving rural livelihoods and facilitating environmentally, socially and economically sustainable development" (IAASTD, 2008:02).

(1997), Norberg-Hodge, Merrifield & Gorelick (2002) and Hailwell (2004). Key authors in the sustainable agriculture or food economy literature that made reference to local food economies included Pretty (2001, 2002), Patel (2007) and Pimbert (2008).

Interesting linkages began to emerge across different research fields, including the links between food, livelihood and environmental security through the food system and the role that local food economies potentially had to play within that. These linkages were affirmed by the findings of key international reports (IAASTKD, 2008; FAO, 2008; UNEP, 2009), and interesting papers on food sovereignty, community food security, local food systems, foodsheds and local food economies. Several case studies were of special interest, including the thriving local food system of post-oil Cuba (Funes *et al*., 2002; Duenas *et al*., 2009).

The literature review can be considered a comprehensive review that included a holistic approach to both modern and local food systems by considering impacts from the production side through to patterns of distribution and consumption. An attempt was made to strike a balance between quantitative data as well as the more qualitative findings that I considered to be of equal importance. The literature review was limited in that several case studies that may have been of relevance were not included due to the scope of the study coupled with time and other constraints that did not allow all possible literature to be reviewed. Main sources of error may be derived from the types of literature that were drawn on as a result of personal potential bias towards community driven solutions and opinions on the importance of environmental sustainability. An attempt was made to substantiate these views through key international reports and published case studies.

3.3.2 Empirical data collection methodology

Empirical data was sourced to build an understanding of the current status of local food production, distribution and consumption in Stellenbosch and thereby contribute to meeting the second research objective (as outlined in Section 3.2, ii). Further empirical data was sourced in support of understanding implications of realising nutritionally optimal consumption and the potential productive capacity of the region in order to make recommendations for localising the food system in the third and final research objective.

The aim of the research was to provide a broad overview of the Stellenbosch food system (production, distribution and consumption) through an analysis of existing data. As recognised by Peters *et al*. (2008:01) in their review of food system analysis methodologies, "tools are needed to determine how the environmental impact and vulnerability of the food system are related to where food is produced in relation to where it is consumed. To this end, analyses of foods sheds, the geographic areas that feed population centres, can provide useful and unique insights". Primary data collection was not undertaken due to the large size of the research boundary (the entire

Stellenbosch Municipal Area) and time limitations, but several recommendations are made in Table 2 (below) on opportunities for further scholarship that include primary data collection for certain areas of the research.

The departure point was to establish whether any existing research had been undertaken on Stellenbosch's local food system and several departments within the University of Stellenbosch and other local research institutions (including the Department of Agriculture, the Agricultural Research Council and LandCare) were contacted. Several interviews revealed that no study had previously been undertaken to assess the entire food system of Stellenbosch. The research was broken down into (1) production and productive capacity, (2) distribution and (3) current and nutritionally optimal consumption, and the research methodologies for investigating each are described in detail below and summarised in Table 2 below.

Several limitations were encountered during the research which are also outlined in Sections 3.3.2.1 - 3.3.2.3 below, and as a result inferences or estimations were made in order to provide a broad overview for the state of the Stellenbosch food system and to meet the second research objective. Table 2 outlines the original research aim, the actual research approach and findings (due to limitations encountered) as well as opportunities for further research that were identified as a result.

3.3.2.1 Current production and productive capacity

Investigation into the current status of production revealed that the only complete census that had been undertaken of agricultural production in Stellenbosch was through the Commercial Agriculture Census 2002 (Statistics South Africa, 2006). The study was undertaken as part of a national survey of large and small scale agriculture for the National Department of Agriculture through face to face interviews from 14 August 2000 to 18 September 2000 (Statistics South Africa, 2006:01). The main sources of error included factors such as peri-urban market gardens not being included in the survey, farmers who were not able to give accurate estimates and double accounting on shared land (Statistics South Africa, 2006:03-04). A more recent census had been undertaken in 2007, but will only be released at a district level in early 2010 despite requests for access to information that were made (Mnyaka, 2009). The boundaries of the study for the census were found to be the Stellenbosch Statistical Region (refer to Figure 10), which are slightly different to the boundaries of the study area which is the Stellenbosch Municipal Area (refer to Figure 11). The main difference in the boundaries is that the Stellenbosch Municipal Area includes more of the northern Wemmershoek Forest Reserve and less of the Hottentots Holland Nature Reserve as demarcated by the Stellenbosch Statistical Region. As both of these sections are nature reserves, they are not expected to impact drastically on agricultural production figures for the region. It was

not possible to disaggregate the data from the Stellenbosch Statistical Region to realign the boundaries to that of the Stellenbosch Municipal Area (Verhoef, 2009), and therefore the error was accepted as a limitation of the study.

A further limitation of the study, as identified by Hinrichs (2003:33) is that "spatial relations of 'local' may not always map in consistent ways onto specific social or environmental relations". The geographic boundaries selected for this study allow for comparison of population demographics with agricultural production but may not reflect cultural or geographic zones that are best suited to the definition of a suitable foodshed. Recommendations presented in Chapter Five include the consideration of increasing the boundaries of the foodshed to a wider radius (that would allow for the inclusion of other produce) coupled with detailed surveys of both production and consumption for the region beyond secondary data analysis.

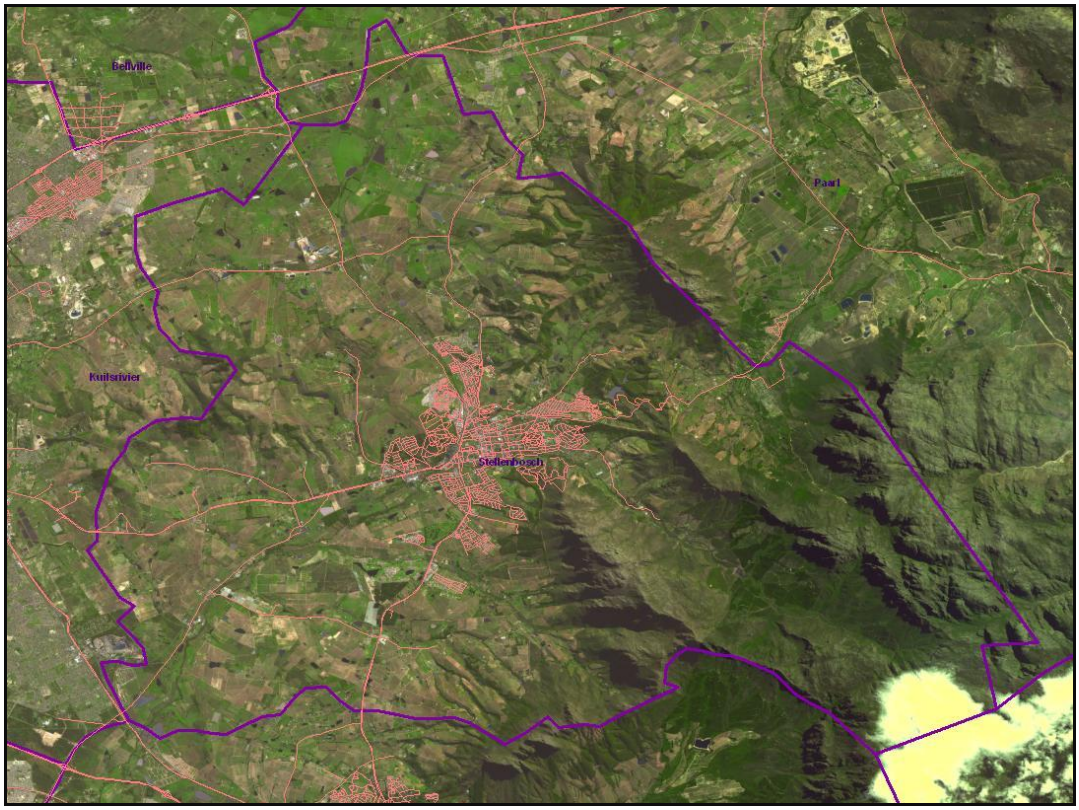


Figure 10: Stellenbosch Statistical Region

Source: Verhoef, 2009

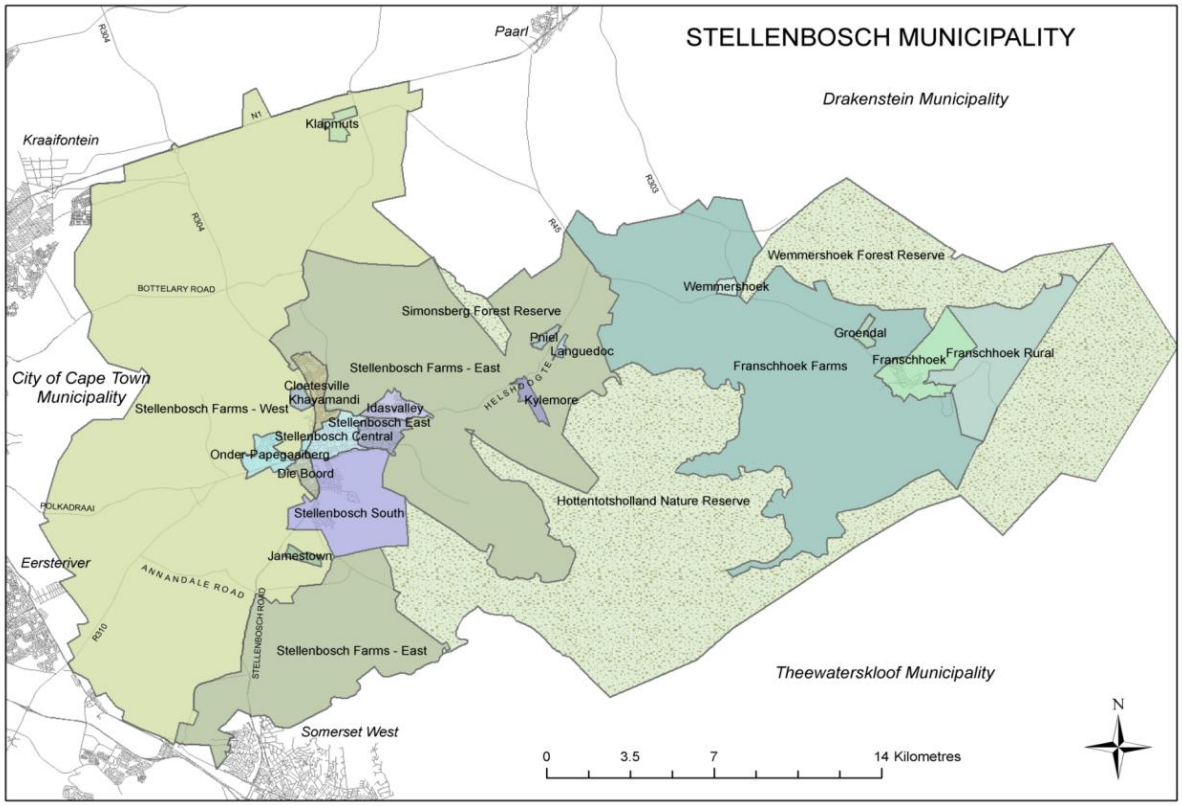


Figure 11: Stellenbosch Municipal Area (SMA)

Source: Stellenbosch Municipality, 2009

For livestock production, the conversion rates from livestock to meat were obtained from an interview with the Department of Animal Science at the University of Stellenbosch. This interview revealed that the livestock figures from the 2002 Census appeared to be significantly lower than what they were expected to be (Hoffman, 2009). Further investigation was therefore carried out with the Red Meat Association of South Africa and local abattoirs, but they did not have the data disaggregated for the Stellenbosch region and were unwilling to release information on local meat production. Extensive consultation was carried out with the Western Cape Department of Agriculture at Elsenburg to establish livestock carrying capacity for land and average productivity of livestock for milk and egg production in the Stellenbosch region (Joubert, 2009).

Henk Stander of Welgevallen Experimental Farm with the Department of Genetics at the University of Stellenbosch was contacted regarding fish production for the region which was not captured in the 2002 Census, and data was received on total volume of fish (i.e., trout) produced from within Stellenbosch and equivalent volumes of water used (Stander, 2009).

A survey of emerging farmers was carried out in 2006 by the Department of Agriculture, all of whom had not been included in the Commercial Agriculture Census of 2002. This list was acquired

from the Western Cape Department of Agriculture (Murdoch, 2009) and narrowed down to farmers from the Stellenbosch Municipal Area. The survey included 45 farms in the Cape Winelands District Municipality, of which nine fell into the Stellenbosch Municipal Area. Each farmer was individually interviewed telephonically to follow up on their current activities as well as find out further information not included in the survey that pertained to the research on local food systems. Questions relating to empirical data collection that were asked included annual production (tonnes), size of the land (hectares) and total number of farmers and / or labourers working the land. Of the nine farms originally surveyed, only seven were still active which meant a fall from 61 to 24 active emerging farmers in Stellenbosch since 2006. Six of the seven farms interviewed were farming vegetables, with the seventh farming peaches. Further emerging farmers may have started since the survey was undertaken in 2006 and would not have been captured in the interviews carried out. The emerging farmers were asked if they knew of other emerging farmers in the region, but no further farmers were located beyond those identified by the original survey. Several of the farmers were not certain of the actual size of the land they were farming or the volume of vegetables they produced in one year, and estimations were made for approximately 40 percent of the farmers based on productivity rates of other emerging farmers from the region.

Further study is required to build a more accurate representation of production for the Stellenbosch region. Breede River Municipality undertook a comprehensive study to map farm productivity which involved farm to farm surveys on production and mapping the results spatially (Roscher, 2009). This is a time intensive and expensive undertaking, but would be hugely valuable for creating an accurate understanding of food production within Stellenbosch and is a core recommendation for future research.

The total volumes of food produce from Stellenbosch were included in a master template in Microsoft Excel which was used to compare total production with total consumption and nutritionally optimal consumption (research design and methodology described for consumption in Section 3.3.2.3). Crop yields for the area, obtained from a local agricultural consulting firm (van Wyk, 2009) and a local seed company (Hygrotech, 2009), were used to infer land requirements to meet current and nutritionally optimal consumption demands. This was then compared with current land use, land availability and potential productive capacity for the region.

A GIS (Geographic Information System) specialist with experience of the Stellenbosch and Cape Winelands datasets was approached to assist with correlating various GIS datasets for the Stellenbosch region. Findings from the Cape Winelands Area Based Plan[48] (DLA, 2008) which identified areas of low and moderate potential for agricultural activity were spatially overlaid

[48] The Cape Winelands District Municipality includes the Stellenbosch Muncipal Area.

through GIS with the current land use to identify portions of land with low or moderate potential that were potentially available for food production (Herd, 2009). Further investigation was also done to establish the urban footprint of Stellenbosch in order to identify potential productive capacity of urban agriculture within Stellenbosch (Herd, 2009).

Available land was then multiplied by productivity ratios for various crop types (van Wyk, 2009; Hygrotech, 2009) to give an estimation of potential productivity for the region. These estimates were valuable in giving a broad indication of the potential for Stellenbosch to produce its own food, but would require further detailed research on actual potential of the land (soils tests, water availability, and climatic conditions). These productivity ratios are also based on modern agricultural methods (such as monocropping or hybrid seeds) and further investigation should also be undertaken specifically on the productivity ratios of agroecological approaches to food production, given the context of water scarcity, climate change and peak oil and the potential of agroecological methods to build resilience of farms in meeting these challenges (Pretty, 2001; Pimbert, 2008). Furthermore, the potential to produce food does not equate to viable markets for selling produce and this would also be an area of further investigation.

3.3.2.2 Distribution

The research aimed to provide a clear overview of the flow of food originating from Stellenbosch (i.e., where local produce goes) through to the food being consumed by Stellenbosch residents (i.e., where locally consumed food comes from). The majority of fresh produce produced in Stellenbosch (wine grapes and stone fruits, mainly peaches) were found to be for export-orientated markets (Louw, 2009:40; SAWIS, 2009:26). Data on local distribution was extremely difficult to source, mostly due to tracking systems not being in place (especially for vegetables) and due to restrictions on data release for information that was tracked by the Red Meat Association, local abattoirs and the National Fresh Produce Markets (Becker, 2009; Malan, 2009). Interviews were therefore undertaken with selected local farmers, regional distributors and local retailers in order to provide an overview of the complexities and possible inefficiencies within the distribution system. These are detailed in Section 3.3.3 below. Effectively determining the distribution component of the research proved to be highly challenging without conducting extensive primary research and is identified as an opportunity for further scholarship.

3.3.2.3 Current and nutritionally optimal consumption

Investigation into the consumption patterns for Stellenbosch proved equally difficult. Interviews with the Department of Human Nutrition at the University of Stellenbosch and extensive research revealed that no food consumption survey had been undertaken specifically in Stellenbosch and no survey had been done for the Western Cape region since 1973 (Steyn, 2009).

Consumption patterns for the population of Stellenbosch were inferred from the National Food Consumption Report (Nel & Steyn, 2002) which is a collective report of several food consumption surveys completed over the period 1983 – 2000. This report was recommended as the best baseline for inferring consumption for the Stellenbosch region based on available research (Steyn, 2009). The report "meta-analysed some of the main dietary surveys undertaken in South Africa over the past two decades. Although dietary surveys are known to be fraught with many methodological limitations, this report has combined a series of statistical techniques in a logical sequence in order to estimate the usual food consumption of adults and children in both urban and rural areas" (Labadarios, 2002 in Nel & Steyn, 2002:i). The report therefore represents the average typical food consumption for the entire nation by age group and is not disaggregated by income or ethnicity. The National Food Consumption Report drew on two methodologies to determine typical adult consumption profile, referred to as Methodology 1 (or M1) and Methodology 2 (or M2). The values for the two methodologies did not differ greatly, and an average of the two were used for the purposes of this study.

The food consumption by food product and group was weighted by age group based on findings of the Community Survey 2007 (Statistics South Africa, 2007) which was the most recent population survey for Stellenbosch (Zietsman, 2009). The research can therefore be seen as an estimation of what Stellenbosch might consume based on national trends using the only data available at the time of the research. The population demographics of Stellenbosch and the Western Cape in general vary greatly from the rest of the country. The South African demographic profile is 79.3 percent African, 9.1 percent White, 9 percent Coloured and 2.6 percent Asian and Indian (Statistics South Africa, 2009:04) The Stellenbosch population is constituted of 55 percent Coloured, 26 percent African, 18.5 percent White and 0.5 percent Asian, (Zietsman, 2007:10). Given that the population of Stellenbosch is therefore likely to consume a different typical diet from the rest of the country as a result of different cultural preferences and consumption patterns, a core recommendation for future research is to investigate consumption trends for the Stellenbosch region.

During the course of the research, it was found that regions of Stellenbosch experienced high food insecurity. This was highlighted through a recent study of the Western Cape that mapped several human needs indices in order to identify regions of high food insecurity as part of an ongoing research programme of the Department of Human Nutrition at the University of Stellenbosch. The synthesis index (or composite human needs index) comprised of several indices weighted through Multiple-Criteria Decision Making methodology and mapped spatially through GIS (van Niekerk, 2009). The final weighted indices included: income index (20 percent); education index (16 percent); percentage unemployed (14 percent); gender index (11 percent); percentage unskilled

workers (10 percent); housing index (9 percent); services index (8 percent); land use index (6 percent); population index (3 percent); age index (2 percent); percentage Black and Coloured population (1 percent), (van Niekerk, 2009).

This mapping exercise revealed that areas that fall within the Stellenbosch Municipal Area are recognised as being highly food insecure (refer to Figure 19). Food security can be considered a critical foundation to livelihood security and an enabling factor for promoting sustainability (Khoza, Troskie and Jacobs, 2009). This motivated an investigation into what a nutritionally optimal diet might look like in comparison to current estimated consumption. The motivation for this investigation was that when assessing whether Stellenbosch had the capacity to meet local consumption needs with local production, it became evident that current consumption patterns did not translate into food security. Therefore, an understanding of the food demands of a nutritionally optimal consumption would provide a baseline of what Stellenbosch would need to produce to meet local demand whilst ensuring food security for all.

The second part of the study on consumption was to compile a profile of what a nutritionally optimal diet might consist of, and what this would translate into in total tonnes per annum required for the Stellenbosch population to be food secure. Attempting to bring together production and optimal nutrition consumption volumes proved highly challenging as the two groups are measured in different units. Food groups from a nutrition perspective are most often categorised by macro-nutrient type, e.g., fats, proteins or carbohydrates, which do not correspond to only one food group such as cereals or vegetables (Lombaard, 2009).

The food pyramid approach was taken, which provides a recommended daily allowance by food group whilst still ensuring sufficient nutrition and diversity across macro-nutrient groups (Davis, Britten & Myers, 2001:883; Painter, Rah & Lee, 2003:483). The core food pyramids that were drawn on include the Healthy Eating Foods Pyramid (Harvard School of Public Health, 2009), the Healing Foods Pyramid (University of Michigan Integrative Medicine Clinical Services, 2009) and the My Pyramid Programme (USDA, 2009). The recommended daily allowances for different food groups suggested by the different studies were found to be very close, and the Healing Foods Pyramid which promotes a healthy diet through low meat intake was taken as the baseline study given both the health and environmental impacts of high meat consumption (UNEP, 2009:17). The Food Pyramids are limited in that they are adapted to American dietary preferences but do provide a baseline for nutritional security (Painter, Rah & Lee, 2003:489). Further research should be conducted on the cultural preferences of the Stellenbosch community that would contribute to building a set of dietary guidelines for a nutritionally optimal diet adapted to local preferences.

Again, the nutritionally optimal consumption was weighted by age group. This exercise was undertaken not on the presumption that overnight Stellenbosch would begin to consume a nutritionally optimal diet, but rather to identify major areas of concern in current consumption patterns and possible areas of intervention through targeted programmes. Both current and nutritionally optimal consumption were then compared with current and potential productive capacity as the foundation for making recommendations for promoting sustainability through Stellenbosch's food system by building a stronger local food economy.

The strengths of the research include that it provided an overview of the Stellenbosch food system that had not previously been studied in depth or brought into a consolidated view, especially with the export orientated focus of the agricultural sector and the globalised nature of the food system. The research findings (and lack of available data) highlighted the low value given to issues of local food security through local production and the underrated potential for local food systems to promote livelihood security as well. Several opportunities for further scholarship have been identified and are summarised in Table 2 below.

The research also experienced several limitations, including the limited data that was available and the estimations or inferences that had to be made in the absence of accurate primary data. The study recognises that this is not an accurate representation of the current food system of Stellenbosch, but rather a starting point for comparison and further study. Main sources of error would arise from the inability to align the Stellenbosch Statistical Region with the Stellenbosch Municipal Area boundaries, the outdated values from the Agricultural Commercial Census 2002 Data and the inaccuracy of the National Food Consumption Report for the Stellenbosch population.

3.3.3 Ethnographic research methodology

Given the complexity of the research case study, it was imperative to investigate beyond the empirical data through ethnographic case study methodologies in order to gain first hand a better understanding of the functioning of the current food system and perceptions around local food economies.

Ethnographic research was undertaken to meet both the second and third research objectives as outlined above. The interviews were semi-structured in that a set of questions were planned and presented during the interviews, but adapted and developed as the interview progressed in response to the issues being raised by the interviewee. Whilst most of the interviews were carried out in person, some of the interviews were telephonic when the interviewees were not available for personal interview. Interviews with farmers, retailers and consumers were conducted in order to better understand the current food system of Stellenbosch. Further interviews were undertaken to document local food initiatives that also formed part of the current food system, the findings of

which are described in Box 2, Box 3 and Box 4. The initiatives that were chosen are ones that I have had personal experience with over the past two years (therefore having a longer period of time to become familiar with the projects and assess the integrity thereof), have not previously been documented and are, to my knowledge, the only examples of initiatives that are consciously supporting the local food economy. For example, other projects may be organic and through land reform but are not strictly local, or may source some of their produce locally (consciously or unconsciously) but don't place local sourcing as a core principle of their activities.

Secondly, interviews were carried out with the objective of better understanding opportunities and barriers for promoting a local food economy in Stellenbosch as part of meeting the third and final research objective: (iii) to recommend measures which can be taken to promote greater sustainability through Stellenbosch's food system. Experts on the local food economy were spoken to including representatives from the local municipality, Department of Agriculture and University of Stellenbosch as well as local farmers (both emerging farmers and commercial farmers), store managers from the retail sector and local consumers to ascertain their perceptions around localisation. Non-formal interviews were carried out continuously through my professional work on land reform and food security for the Sustainable Stellenbosch programme that I coordinate. These non-formal interviews and daily experiences of working across sectors in Stellenbosch have been critical in shaping an understanding of the key sustainability challenges and opportunities for Stellenbosch.

A strength of the ethnographic research employed is the extent to which it provided a deeper context to the empirical research and assisted in the identification of potential barriers and opportunities for promoting greater sustainability through Stellenbosch's food system. The case studies of local food initiatives that were documented provided meaningful examples of the key characteristics of a local food economy (moving beyond food miles alone to promote community resilience and building through food). Experts from a range of sectors (community services through to agricultural economics) were able to provide valuable insight to the research.

The limited number of interviews that were carried out during the research, mostly due to time constraints, can be considered a limitation of the research. Whilst several local food initiatives were documented, there were other initiatives that were not investigated fully (including local farmers' markets or feeding schemes) that warrant further investigation and research. Also, perceptions from commercial farmers on local food systems were not fully represented by the interview selection, again due to time constraints. Main sources of error can be attributed to the potential bias in the interview questions and the potential misinterpretation of the interviewees' responses to

the interview questions. Conscious efforts were made to ask open questions and ask for clarity when the answers were unclear to avoid guiding the research or misinterpretating the findings.

3.4 Chapter summary

The research design was built to meet the research objectives as outlined in Section 3.2 and produce the research findings presented in Chapter Four. Sufficient literature was available to complete a comprehensive literature review in order to meet the first research objective. Despite extensive investigation, the absence of comprehensive and accurate empirical data on the functioning of the current food system in Stellenbosch resulted in estimations and inferences being made in order to create an overview for the food system. The case studies documented highlighted the importance of local food economies in promoting sustainability. The research findings brought together previously uncorrelated sectors and broad inferences were established within the limitations of the available data to provide an overview of the current production, distribution and consumption of food in Stellenbosch (in order to meet the second research objective) as well as productive potential of the region, in support of making recommendations to localise Stellenbosch's food system. These research findings provided a platform for making recommendations to promote sustainability through Stellenbosch's food system and thereby meet the final research objective. The research identified several opportunities for further scholarship that would strengthen the findings of this research and are described further in Chapter Five, Section 5.4.

Table 2: Research ideal, actual, outcomes and opportunities

Research design		Ideal research methodology	Actual research methodology	Research outcomes	Research opportunities
Literature review		Comprehensive literature database with documented case studies of local food economy initiatives and experiences.	Substantial literature found on international experiences. No formal literature found on Stellenbosch but this created an opportunity for documenting the findings and relevant case studies.	Representative literature review.	Documenting further Stellenbosch local food economy initiatives and opportunities in greater detail (such as local markets, cooperatives etc).
Empirical data collection	Production	GIS Map with erf specific values for both productive capacity and actual output.	Data used from the Commercial agriculture census data (2002) and Emerging farmer census data (2006 / 2009). Findings of Cape Winelands Area Based Plan on productive capacity (2006) and the Specialist Soil and Land Study for the Cape Winelands (2007).	Estimated production for Stellenbosch per product in tonnes. Potential productive capacity for the Stellenbosch region by current land use and broad productive potential.	Detailed surveys and mapping of both actual and potential productivity.
	Distribution	Detailed surveys of where farmers sell their food to.	No data available from farmers where they sell their food to. General statistics on exports for certain commodities (Louw, 2009; SAWIS, 2009).	Broad overview of distribution patterns for parts of the distributions chains through inferences and estimations.	Detailed surveys of where farmers sell their food to.
		Accurate accounting systems from local retailers on where they source their food from.	Estimates from retailers on percentage of food locally sourced.		Systems for retailers to account where food is sourced from.

		Detailed surveys of where people purchase their food from.	National estimates of typical purchasing habits (BFAP, 2009).		Detailed surveys of where people purchase their food from.
	Consumption	Representative profile of typical consumption patterns across various demographic groups in Stellenbosch. Locally suitable nutritionally optimal diet across age groups.	National food consumption report (2002) compared with multiple Food Pyramid studies (2009).	Estimated consumption patterns for local residents. Inferred nutritionally optimal diet from multiple studies.	Detailed surveys on typical consumption patterns for multiple demographic profiles of Stellenbosch. Locally suitable nutritionally optimal diet across age groups.
Ethnographic research	Local food system trends interviews	Personal interviews with a wide representation of stakeholders to ascertain their perceptions of local food economies, barriers and potential for expansion	Limited number of formal interviews due to time constraints. Continuous discussions and investigation.	Increased understanding of local food system trends, as well as opportunities and barriers for strengthening the local food economy.	In depth market analysis research on further opportunities for local food economy initiatives within different sectors, e.g., restaurant, hotel and tourism sector, university catering sector, local schools etc.
	Local food economy case studies	Personal interviews with selected case study subjects.	Personal interview with selected case study subjects	Descriptive case studies of current local food economy initiatives.	Further case study documentation.

Chapter Four: Research Findings

4.1 Introduction

This section aims to provide research findings in support of the second[49] and third[50] research objectives as identified in Chapter One, Section 1.2. An overview of the context of Stellenbosch (Section 4.2) and core findings on the current status of food production, distribution and consumption (Section 4.3) are presented in support of the second research objective and in order to provide a baseline for the final research objective.

In the context of high levels of food insecurity, the food requirements for a nutritionally optimal consumption are put forward (Section 4.4) and the productive capacity of the region to meet both current and nutritionally optimal demand presented (Section 4.4 and Section 4.5). These research findings are presented in order to make recommendations to promote a stronger local food economy (based on the findings of the first research objective in Chapter Two) and thereby promote greater sustainability through Stellenbosch's food system (in support of the final research objective). A selection of case studies are presented throughout to provide context to a growing local food movement, and highlight some of the challenges and opportunities for promoting local food economies in Stellenbosch, also in support of the final research objective.

4.2 Overview of Stellenbosch

The Stellenbosch Municipal Area (SMA) covers a total of 831 square kilometres and is situated within the Cape Winelands Municipal District of the Western Cape Province in the Republic of South Africa (refer to Figure 12 below). A number of human settlements ranging in size from the large university town of Stellenbosch to the small village of Raithby lie within the area, with a spread of farmlands and natural lands falling beneath the Jonkershoek Mountain Range that pass through Stellenbosch. Agricultural activities are responsible for over 80 percent of land use in Stellenbosch and the predominant farming activity for the region is wine production (Statistics South Africa, 2006). The undeveloped spaces surrounding the human settlements of Stellenbosch are under increasing pressure from developers attracted to the picturesque region. Beneath the charm of Stellenbosch lies deeply rooted social inequality as a legacy from the Apartheid era and increasing resource based challenges.

[49] to investigate the current status of local food production, distribution and consumption in Stellenbosch
[50] to recommend measures which can be taken to promote greater sustainability through Stellenbosch's food system

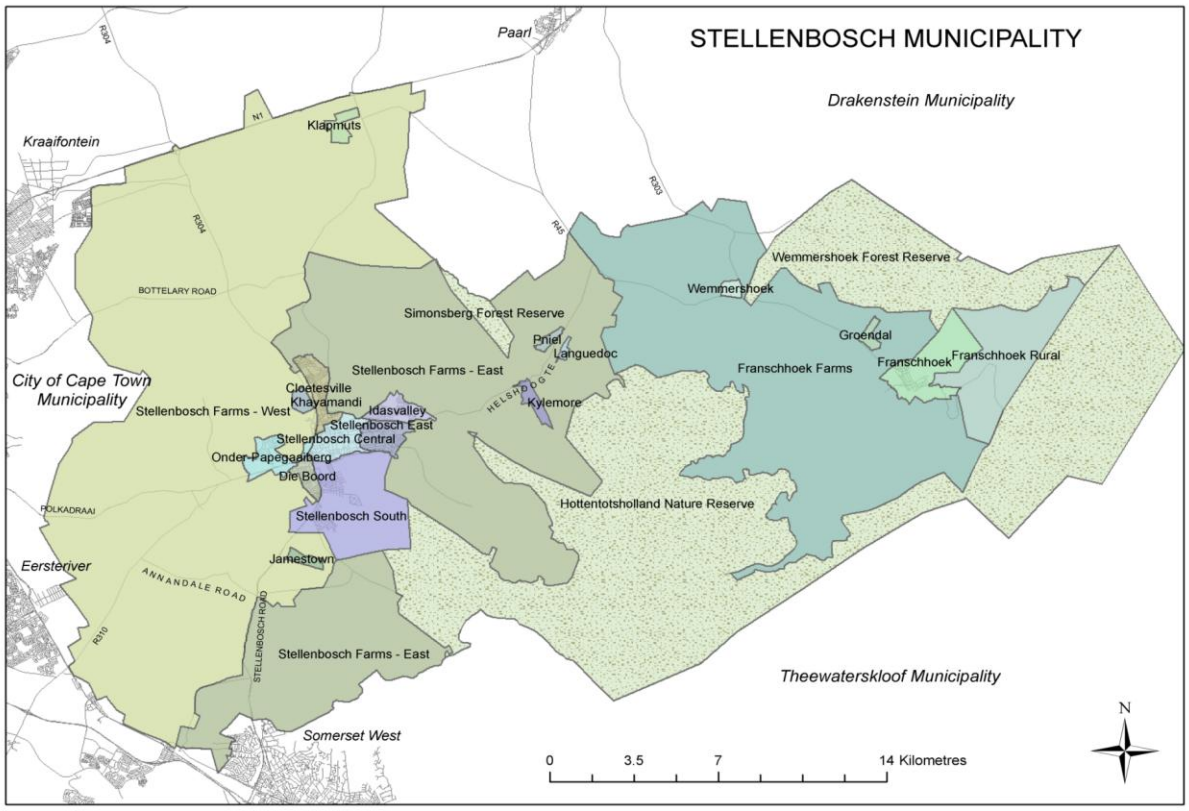


Figure 12: Boundaries of the research area: Stellenbosch Municipal Area

Source: Stellenbosch Municipality, 2009

The Stellenbosch population is constituted of mostly Coloured residents (55 percent), followed by Africans (26 percent) and then Whites (18.5 percent) with a small minority of Asians (0.5 percent), (Zietsman, 2007:10). Table 3 below indicates the current and projected population estimates for Stellenbosch.

Table 3: Demographic profile of Stellenbosch

Population group				**Annual growth rate**
	1996	**2007**	**2015**	**2007 (percent)**
Coloured	65,967	110,168	142,594	3.5
African	17,514	52,153	91,944	6.2
White	28,655	37,272	41,729	2.1
Asian	299	934	1,515	6.7
Total	**112,434**	**200,527**	**277,782**	**4.2**

Source: Zietsman, 2007

Whilst Stellenbosch is not experiencing the sharp urbanisation characterising the larger cities of the developing world, the informal settlement areas of Stellenbosch continue to grow on the urban

periphery and remain underserviced. As recognised in the Integrated Development Plan (IDP) of Stellenbosch Municipality (2009:17), “the faster growth of the African population is changing the demographic composition of Greater Stellenbosch, requiring targeted intervention to ensure adequate land for residential and other purposes as well as infrastructure and service delivery”. Furthermore, the demographic profile of the Stellenbosch Municipality indicates that approximately a quarter of the population are younger than fifteen years old, suggesting a strong dependency ratio. This has implications on the need for both educational facilities and job creation to support this growing population.

The main economic activities of Stellenbosch are described in Table 4 below, which indicates that whilst agriculture is the largest sector by land use (refer to

Figure 14), the main revenue streams are derived from other sectors, including finance and business services and manufacturing (WCPG, 2007:136). Manufacturing is the largest employer in Stellenbosch followed by wholesale and retail, and community and personal services (shown in Table 5Table 4 below). Manufacturing is closely linked to the agricultural sector, which itself is not a large employer but indirectly supports a number of other sectors in Stellenbosch. The proportion of workers in the agricultural sector has declined dramatically since 2001, from 24 percent to 6.9 percent (Stellenbosch Municipality, 2009:20) and this is discussed further in Section 4.3.1. Stellenbosch Municipality has recognised tourism, agriculture, export, construction and IT & communications as the most relevant sectors for growth in the Stellenbosch economy (Stellenbosch Municipality, 2009).

Table 4: Stellenbosch contribution to Regional Gross Domestic Product (2005)

Sector	RGDP (Rm)	Percent
Agriculture, forestry and fishing	302.6	10.0%
Mining	7.0	0.2%
Manufacturing	608.7	20.1%
Electricity & water	9.8	0.3%
Construction	111.3	3.7%
Wholesale & retail trade; catering & accommodation	407.5	13.5%
Transport & communication	132.3	4.4%
Finance and business services	863.1	28.6%
Community, social and other personal services	161.9	5.4%
General government services	386.4	12.8%
Total	**3022.9**	**100.0%**

Source: WCPG (2007:136)

Table 5: Employment by economic sector (2009)

Sector	Percent
Manufacturing	20.1 %
Wholesale & retail trade; catering and accommodation	16.2 %
Community, social and other personal services	15.9 %
Undetermined	13.8 %
Finance and business services	8.3 %
Construction	7.7 %
Agriculture, forestry and fishing	6.9 %
Transport & communication	2.0 %
Mining	0.9 %
Electricity and water	0.5 %

Source: Stellenbosch Municipality, 2009:20

The mean monthly incomes for the African and Coloured residents of Stellenbosch as a share of total mean for all population groups have increased marginally over time, indicating decreasing inequality in a region with arguably one of the highest levels of inequality in the world. Stellenbosch currently has some of the greatest discrepancies between poverty and wealth (Stellenbosch Municipality, 2009:20) in a country with a gini co-efficient[51] of 0.72 (Statistics South Africa, 2008:03), which is considered to place South Africa in the top ten most unequal countries in the world (UNDP, 2008; CIA, 2008).

Major challenges recognised by the Ward Councillors[52] for Stellenbosch include housing, unemployment, crime and poverty alleviation in the Coloured communities, law enforcement, urban growth and conservation in the White communities and crime and cleansing in the African communities (Stellenbosch Municipality, 2009:26-32). The issues raised by the Ward Councillors point to challenges of poverty at multiple levels (that need to be addressed alongside with deep inequality) through targeted growth that values social upliftment, greater social integration and community building above economic growth alone. A key finding presented in Chapter Two (Section 2.2) is the failure of the economic growth model to realise improvement in quality of life (Ayres et al., 1996:02). In the context of growing resource constraints, there is increasing pressure to realise development through equitable and sustainable development.

These social challenges will only be compounded further by the resource based challenges that Stellenbosch is already facing. Water shortages are commonplace during the dry summer months

[51] The gini co-efficient represents level of disparity between wealthy and poor (Statistics South Africa, 2008:35).
[52] Locally nominated political representatives for municipal sub-units called ‘wards’.

and are expected to worsen as population growth puts increasing demand on dwindling water supplies as a result of climate change (Hewitson, 2006; Stellenbosch Municipality, 2008; Smit, 2009). This will impact directly on the local economy of the region (in sectors such as agriculture or tourism), as well as the quality of life for its residents.

The national energy provider, ESKOM, has placed limits on growth and expansion through electricity restrictions (Stellenbosch Municipality, 2008:37). The Stellenbosch landfill is full (Serfontein, 2009) and the Stellenbosch sewerage treatment plants are at capacity, with overflow commonplace in the wet winter months (Smit, 2009). In the context of both climate change and peak oil coupled with population growth, Stellenbosch cannot afford to continue down an energy-dependent and waste intensive path of development.

Stellenbosch lies within the Cape Floristic Kingdom, an internationally recognised biodiversity hotspot and less than 10 percent of the critically endangered Renosterveld endemic to the region remains today, with less than 1 percent under formal conservation (von Hase, Ragout, Maze & Helme, 2003:02). As discussed in Chapter Two (Section 2.2.2), basic ecosystem services (such as biodiversity) are continuously providing humanity with a clean and healthy environment that sustains life, whilst protecting communities from threats such as flooding, and providing resources, such as food or energy. Furthermore, a degraded environment severely limits our capacity for development and the extent to which poverty and inequality can be successfully overcome.

Whilst Stellenbosch Municipality's IDP (2009) places emphasis on local economic development and community participation, the natural environment is considered mostly in terms of parks or services, and not as a limiting factor to development. It is therefore proposed that Stellenbosch adopts a more holistic approach to environmental management which takes responsibility for Stellenbosch's contributions to both local and global environmental degradation. Such an approach has the potential to increase quality of life for all citizens, present and future, through the investment in a clean and healthy environment.

In the latest Integrated Development Plan, Stellenbosch Municipality (2009:07) has committed itself to:

i. Eradication of poverty through empowerment
ii. Sustainable economic development and the creation of employment opportunities in the commercial, industrial and agricultural sectors (with special reference to land reform)
iii. Building civic pride and a united town
iv. Spatial, regional and transport planning for sustainability

v. Integrated sustainable human settlements, in particular solutions to homelessness and overcrowding
vi. Sustainable resource use, including energy efficiency/renewable energy, zero waste, secure water supplies and biodiversity conservation
vii. Access to social security programs
viii. Crime prevention and victim support
ix. Health provision, including the promotion of healthy living
x. Youth and Gender issues

Furthermore, the formal Memorandum of Understanding between the University of Stellenbosch and Stellenbosch Municipality recognises that "addressing the problems and optimising the opportunities of Stellenbosch can best be done by adopting the core principle of sustainability in all spheres of activity, whether that be educational, social, economic, technological, infrastructural or economic" and further commits to "a vision of Stellenbosch as a Sustainable University Town" (Stellenbosch Municipality & University of Stellenbosch, 2007).

The current challenges being faced by the Stellenbosch community (both social and environmental) and the formal commitments to address these in a sustainable manner provide a context for investigating the current food system of Stellenbosch and building a set of recommendations to promote sustainability through Stellenbosch's food system.

4.3 Analysis of the current food system

An analysis of the current food system is presented as the baseline for making recommendations on localising the food system based on the findings of the first research objective and in support of the final research objective. For the purposes of the research, the food system is considered in terms of (1) production, (2) distribution and (3) consumption. An overview of production describes current production by both land use and volume. In light of the challenges encountered with access to distribution data, the distribution component of the Stellenbosch food system is described through a series of examples to highlight current practice and complexities. Consumption patterns are inferred for the Stellenbosch population.

4.3.1 Production

Wine and stone fruit farming are the largest agricultural activities (both by land use and rand value) with vegetable and essential oil production taking place on a smaller scale within the Stellenbosch statistical region (Statistics South Africa, 2006). The deciduous fruit sector, including wine grapes, (87.5 percent) contributes the greatest to total gross farm income, with vegetable (9.9 percent) and other horticultural products (2.6 percent) playing a less significant role. Wine grapes use the largest percentage of land (71.5 percent), followed by peaches (9.6 percent) in the Stellenbosch statistical

region (Statistics South Africa, 2006). There is a large discrepancy between the total area under cultivation for wine grapes as identified by the 2002 Commercial Agriculture Census at 8924 hectares (Statistics South Africa, 2006) and the recent figures from the South African Wine Industry Information and Systems Annual Report 2009 at 17 137 hectares (SAWIS, 2009:08). The SAWIS statistical region termed 'Stellenbosch' covers a much larger area than Stellenbosch Municipal Area alone, including the Cape Metropole (SAWIS, 2009:07). It was not possible to identify land under vineyard cultivation through the GIS data as it could not be disaggregated to represent vineyards as a separate shape file (Herd, 2009). As production of wine grapes is the largest activity by both contribution to total gross farm income and land use, the total area under cultivation for wine grapes is an important indicator within the Stellenbosch context and the estimates by Statistics South Africa (2006) will be considered most accurate. Current land use, available land and productive potential are discussed further below.

Farming activity by region within Stellenbosch

A recent report on the Agricultural Sector for Stellenbosch Municipality by Prof Dan Louw (2009) summarised the farming activities by valley within Stellenbosch (described in Table 6 below), and points to the high diversity of agricultural activities that are currently supported by the region's geography and climate.

Table 6: Summary of farming activities by valley

Region	Main activities	Other activities
Franschhoek Valley	Wine grape	Stone fruits (nectarines, peaches, plum); essential oils (including buchu, lavender, rose geranium); citrus; fynbos; horses cattle
Dwarsrivier Valley (including Pniel and Kylemore)	Wine grapes as well as fynbos and vegetables	Cattle, sheep & pigs
Eersterivier Valley (Stellenbosch and surrounding area)	Wine grape; pome fruit (pears and apples), stone fruit; citrus; olives	Fynbos and vegetables on a relatively small scale. Stellenbosch is not only characteristically a crop production area but is also diversified into animal farming (sheep, cattle and horses).
Klapmuts & Koelenhof	Wine grapes	Includes small amounts of table grapes, stone fruit (plums, peaches and nectarines), citrus, olives and guavas. Most of the farming enterprises are however diversified and would also include an animal enterprise consisting of cattle and horses.

Source: Louw, 2009:22

Assessment of current production by volume

An assessment of current production for the Stellenbosch region was carried out in volume (tonnes) by food group based on the findings of the Agricultural Commercial Census of 2002 (Statistics South Africa, 2006) and individual interviews with emerging farmers from the region. Land use by food group was calculated according to the findings of the Agricultural Commercial Census of 2002 data for stimulants and wine grapes; from the Agricultural Commercial Census of 2002 data and from emerging farmer interviews for vegetables; and from only emerging farmer interviews for roots. Milk, meat and egg production land use was inferred from average land use for livestock obtained from the Western Cape Department of Agriculture (Joubert, 2009). The methodologies for these findings are presented in Chapter Three, Section 3.3.2.1. The core findings of the research on production for Stellenbosch are presented in Table 7 and

below.

Table 7: Current production by food group for Stellenbosch

Food Group	Commercial (kg)	Emerging (kg)	Total (kg)	Total (tonnes)	Land (ha)
Cereals	0.00	0.00	0.00	**0.00**	**0.00**
Sugar	0.00	0.00	0.00	**0.00**	**0.00**
Stimulants (tea)	43,000.00	0.00	43,000.00	**43.00**	**361.00**
Milk	6,486,298.00	0.00	6,486,298.00	**6,486.30**	**503.75**
Meat	2,158,164.14	0.00	2,158,164.14	**2,158.16**	**577.11**
Eggs	2,418,424.14	0.00	2,418,424.14	**2,418.42**	**0.11**
Vegetables	5,211,000.00	1,051,625.00	6,262,625.00	**6,262.63**	**423.50**
Vegetable Oils	0.00	0.00	0.00	**0.00**	**0.00**
Roots	0.00	2,750.00	2,750.00	**2.75**	**1.00**
Wine grapes	86,284,000.00	0.00	86,284,000.00	**86,284.00**	**8,924.00**
Fruit	19,233,000.00	6,000.00	19,239,000.00	**19,239.00**	**2,143.00**
Nuts	25,000.00	0.00	25,000.00	**25.00**	**2.00**
Fish	55,000.00	0.00	55,000.00	**55.00**	**0.00**
TOTAL				**122,974.26**	**12,935.47**

Source: Compiled by the author based on Statistics South Africa, 2006; Joubert, 2009 and multiple interviews with emerging farmers from Murdoch, 2009

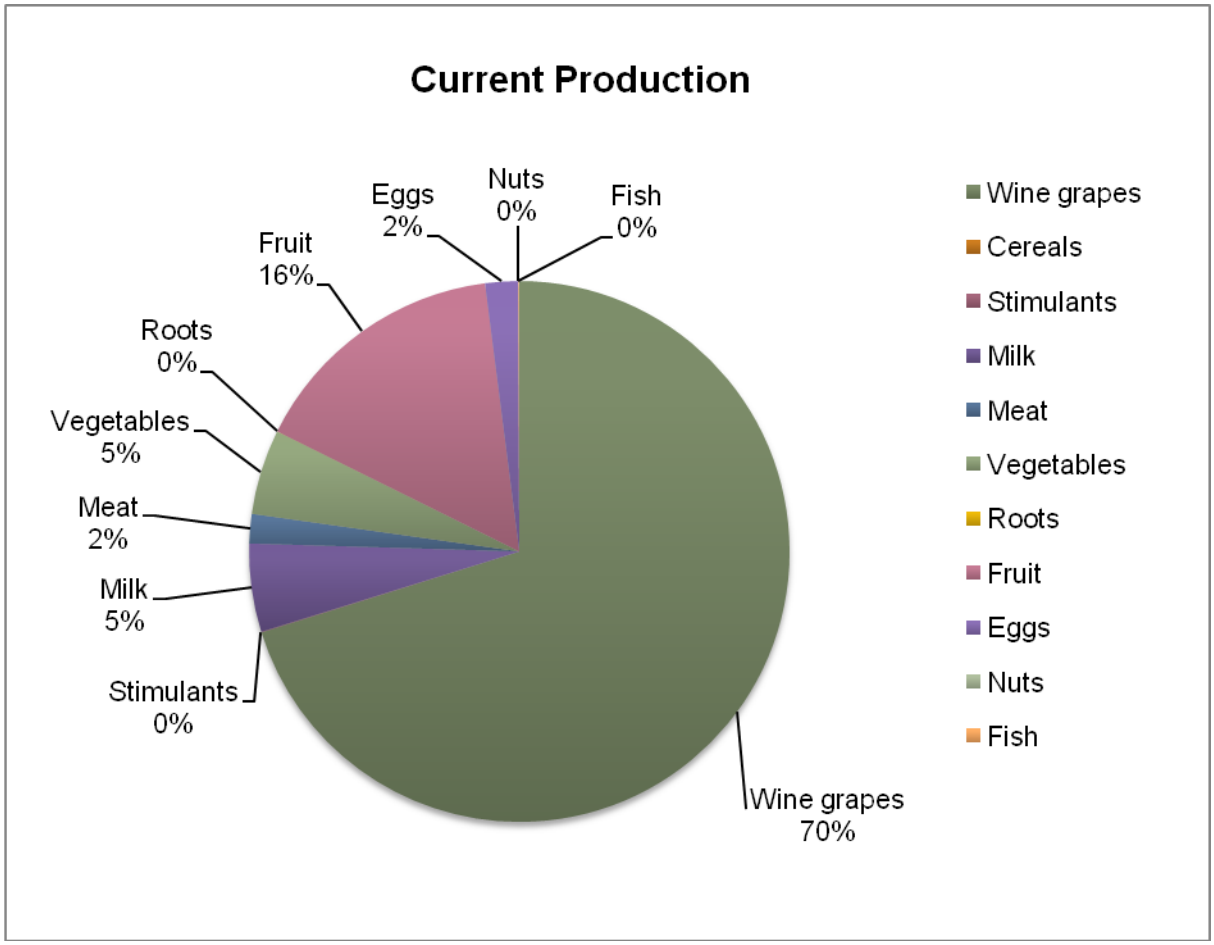


Figure 13: Current production by food group for Stellenbosch

Source: Compiled by the author based on Statistics South Africa, 2006; Joubert, 2009 and multiple interviews with emerging farmers from Murdoch, 2009

The largest sector of production by volume is wine grapes (70 percent), followed by fruit (16 percent). Both the local wine grape and fruit markets are export oriented (Louw, 2009:40; SAWIS, 2009:26), which indicates that the majority of produce grown in Stellenbosch is sent elsewhere. This will be discussed further in Section 4.3.2 (Distribution). Commercial vegetable production (5211 tonnes per annum) is predominantly cabbages, tomatoes, onions and green beans (Statistics South Africa, 2006). Emerging farmers produce these vegetables as well as strawberries, butternut, carrots, spinach, celery, green peppers and a diverse range of further crops to a total of an estimated 1051 tonnes per annum. Smaller quantities of tea (43 tonnes per annum) and nuts (25 tonnes per annum) are also produced in the region. The vegetable market is almost entirely locally orientated (Louw, 2009:50), the distribution of vegetables is discussed further in Section 4.3.2 (Distribution). The region is not considered suitable for sugar cane

production and cereals. Roots are difficult to grow in the local climate and only one emerging farmer was found to be growing small amounts of potatoes (Swarts, 2009).

The livestock production figures for Stellenbosch from the Commercial Agricultural Census of 2002 were suggested by the Department of Animal Science at Stellenbosch University to not be accurate based on their experiences in the region (Hoffman, 2009). As discussed in Chapter Three, Section 3.3.2.1, finding more accurate figures for livestock production for the region proved challenging. It was possible to get more accurate figures for chicken meat and egg production (Prinsloo, 2009), but data for other livestock types was not accessible and therefore Commercial Agricultural Census of 2002 data was used. The livestock were converted from average slaughter weights to carcass weights less bone mass in order to estimate the weight of recoverable meat, summarised in Table 8. In comparison with other agricultural activities, formal livestock farming is relatively small.

Table 8: Livestock production figures for Stellenbosch

Livestock	Number sold	Meat produced (kg)	Land required (ha)	Yield (tonnes / ha)
Dairy cattle	891	94,677.66	222.75	0.43
Beef cattle	989	135,117.18	247.25	0.55
Sheep	2,489	45,339.62	103.71	0.44
Boer goats	20	212.52	0.83	0.26
Pigs	5,131	155,777.16	n/a	n/a
Chickens	2,570,000	1,727,040.00	2.57	672.00
TOTAL		**2,158,164.14**	**577.11**	

Source: Compiled by author based on Statistics South Africa, 2006; Prinsloo, 2009; Joubert, 2009

Agriculture and land use in Stellenbosch

Despite growth in the agricultural sector in Stellenbosch over the past decade being low[53] and the relative value of agriculture as an employer in the region having dropped dramatically from 24 percent in 2001 to 6.9 percent in 2009 (Stellenbosch Municipality, 2009:20), agriculture remains the largest activity by land use and this is shown in Table 9 and

Figure 14 below.

Table 9: Current land use

Class	Perimeter	Area (km sq)	Hectares
Dryland	1,146.82	86.57	8,656.82
Forestry	233.24	31.13	3,112.57
Improved Grassland	23.36	2.85	285.08
Irrigated	1,722.95	246.93	24,692.54

[53] The growth rate for the Stellenbosch agricultural sector was 2.09 percent, 1995 to 2005 (Louw, 2009:07).

Other	172.01	7.52	751.70
Urban	117.38	23.14	2,313.56
Useable Veld	1,391.62	140.92	14,091.78
Wildernis	228.36	332.41	33,241.29

Source: Herd, 2009

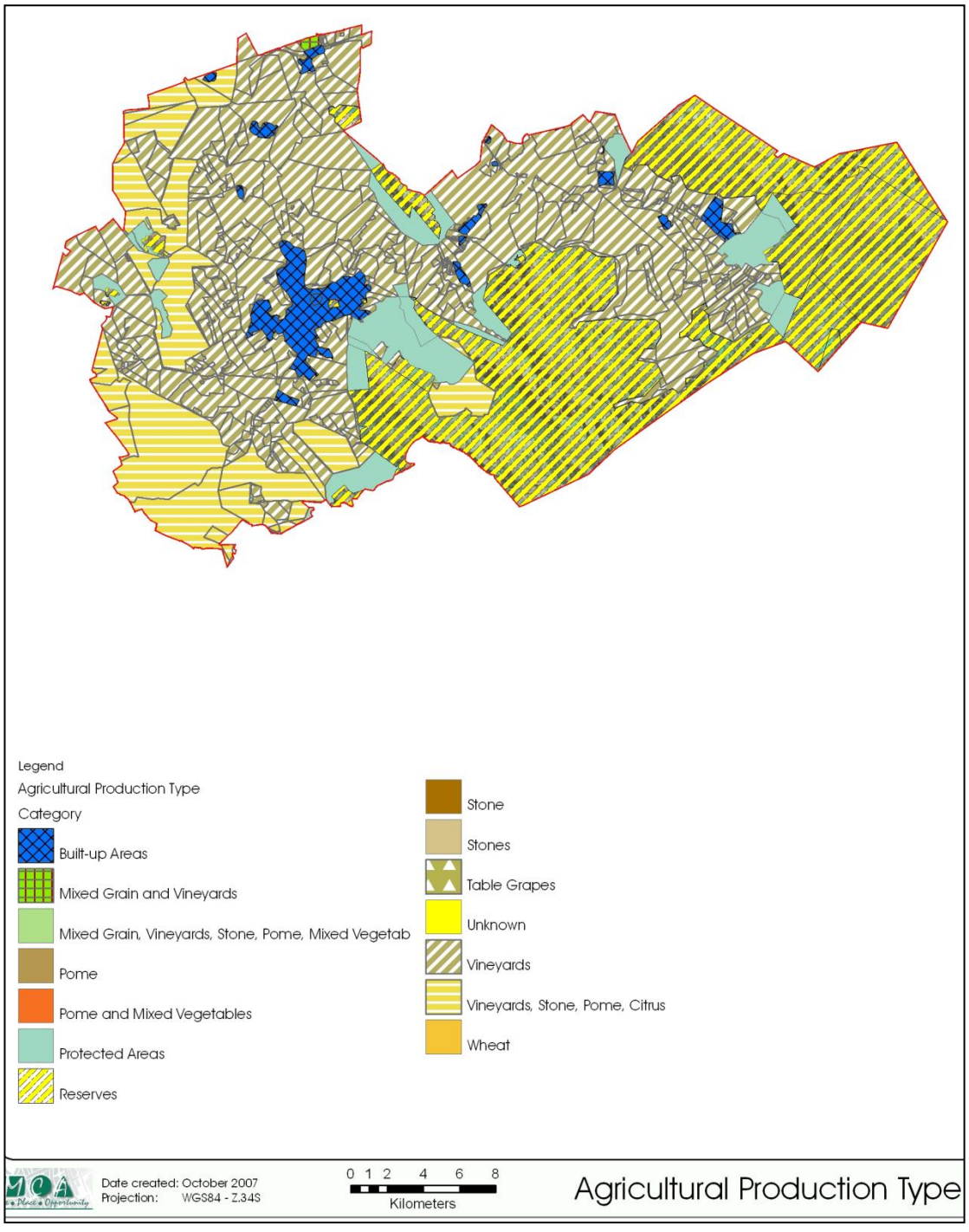


Figure 14: Agricultural Production Type for the Stellenbosch Municipal Area

Source: DLA, 2008:54

Weaknesses of the local production system include low margins of return on agricultural investments[54], the high cost of land (reflected in Table 10) and increasing pressures to develop agricultural land for housing and tourism.

Table 10: Average land prices per hectare (1997 - 2004)

	1997	1998	1999	2000	2001	2002	2003	2004
Ceres	R799	R749	R849	R445	R606	R421	R1208	R683
Montagu	R2,234	R951	R1,407	R555	R1,050	R755	R1194	R1,529
Paarl	R13,693	R9,011	R10,358	R12,407	R22,092	R19,196	R22,831	R22,467
Robertson	R4,040	R2,486	R3,835	R3,245	R3,245	R2,897	R2,678	R3,700
Stellenbosch	R23,681	R29,521	R19,047	R16,692	R18,806	R2,068[55]	R6,959	R18,162
Tulbagh	R11,848	R5,793	R4,889	R4,308	R4,241	R3,981	R9,400	R14,776
Worcester	R2,974	R2,112	R3,840	R2,903	R3,230	R2,243	R3,364	R2,993

Source: DLA, 2008:46

Stellenbosch is dominated by a strong property market that, when coupled with low farm profitability, has led to increasing pressure to develop the town, villages and surrounding farmlands of the Stellenbosch region. For example, 25 emerging farmers in the Vlottenburg area who were farming tomatoes in tunnels were forced to stop in 2007 when the price of leasing land become prohibitive (Hough, 2009). The development of agricultural land not only results in urban sprawl and its associated environmental impacts[56], but the potential for producing food or other agricultural produce from the land is lost as well as the employment that the farms provided to the surrounding community. In this way, uncontrolled development in the Stellenbosch region is affecting the poor and most vulnerable groups most severely.

Employment through agriculture

It has been noted that employment generated through agriculture in Stellenbosch has dropped from 24 percent in 2001 to 6.9 percent in 2009 (Stellenbosch Municipality, 2009:20). The recent decline in employment by the agricultural sector may be attributed to relative increases in employment in other sectors or a number of other factors, but no clear explanation was found

[54] Farms in the Cape Winelands (including Stellenbosch) typically achieve internal rates of return below 8 to 10 percent (DLA, 2006).
[55] The sharp drop in prices for Stellenbosch in 2002 were identified but no explanation could be found in the supporting documentation.
[56] Common environmental impacts associated with urban sprawl include erosion, pollution of rivers and deterioration of water quality (Jabareen, 2006). These all have impacts on soil quality, thereby further affecting the agricultural productivity of the surrounding region.

during investigation (Floris, 2009; Lotreit, 2009). A marked feature of the employment generated through agriculture is the large number of unskilled (mostly female) labourers employed during the pruning and harvesting seasons of grape and fruit production. This is highlighted in Table 11 below. The seasonal employment, and the typically low and insecure wages that it provides, has several impacts on rural communities that contribute to increasing pressure on social services and infrastructure (Louw, 2009:34).

Table 11: Employment in the Stellenbosch agricultural sector

District	Total		Paid employees					
			Farm managers / Farm foremen		Full-time employees		Casual and seasonal workers	
	Male	Female	Male	Female	Male	Female	Male	Female
	Number							
Stellenbosch	7,973	6,941	391	79	3,928	2,344	3,653	4,518
Western Cape	126,999	96,176	5,133	708	63,472	28,894	58,394	66,574
Male/Female ratio in Stellenbosch	57 %	43 %	88 %	12 %	69 %	31 %	47 %	53 %

Source: Statistics South Africa (2006)

The agricultural sector of the Western Cape pays on average 25 percent higher wages than the national average, but it is evident that casual and seasonal labourers still receive relatively low wages in comparison to employees with full time employment when comparing total remuneration with numbers of employees in the two categories (refer to Table 11 and Table 12).

Table 12: Farm labour remuneration

District	Total remuneration	Full-time	Casual and seasonal	Relative contribution (percent)
	`000 (R)			
Stellenbosch	133,579	115,969	17,610	8 percent
Western Cape	1,710,223	1,378,817	331,406	100 percent

Source: Statistics South Africa (2006)

Emerging farmers

Small and emerging farms currently constitute a small percentage of the farms in the Stellenbosch region but should be identified as a sector for prioritisation. Currently, emerging farmers experience multiple barriers to success within the Stellenbosch food system, but play a vital role in creating employment and producing productively off the land for local food security. A typical 5 hectare farm can support a family of 5 and 5 full time labourers (if operating with sufficient water to allow double cropping), (de Wet, 2009). It was not possible to locate a comparative estimate for the number of jobs created per hectare of wine producing vineyard (Floris, 2009), but it is considered to be significant considering the impacts on secondary industries (such as manufacturing and tourism)

for the region. An issue raised by five of the sixteen emerging farmers who were interviewed was their desire to increase the scale of their operations in order to be able to supply full time employment for their seasonal workers (currently limited water rights restricted them from double cropping). Furthermore, emerging farmers on small farms typically focus on vegetable production for local markets that promote local food security through local production (i.e., removing dependency on externally produced food) and stimulates the local economy through the re-circulation of the food dollar.

It was also found that emerging farmers tend to use less chemical intensive methods of production (either going organic to differentiate their product, farming with low external inputs as they cannot afford high external input or going agroecological through an intimate connection to the land itself) and rely on a greater diversity of crops to increase their own resilience. These, combined with the social, environmental and economic benefits of supporting the local food economy (detailed in Chapter Two, Section 2.5.3), point to the value of supporting small-scale emerging farmers in local food production. A case study is presented in Box 2 on a local emerging farmer actively engaged in the local food economy. A discussion is presented in Chapter Five, Section 5.1 on current and potential best land use for the Stellenbosch region with respect to wine and food production.

Box 2: Eric Swarts, local organic farmer

Eric Swarts is a local organic farmer who actively markets his produce locally through a variety of initiatives. Eric is one of several emerging farmers in the area who received land through a land reform programme supported by a local wine estate, Spier, and the Stellenbosch Municipality in 2002. Eric has converted his farm to fully organic over the past few years and today produces a diverse range of high quality organic vegetables (refer to Table 13 for estimated production per annum) on four of the ten hectares he leases.

Table 13: Vegetable production per annum on Eric's farm

Vegetable	Per Week	Weeks in production	Total per annum
Lettuce	10 – 20 kg	50	750 kg
Beans	200 kg +	25	5 000 kg
Spinach	50 bunches	50	2 500 bunches
Spring onions	5 kg	50	250 kg
Leeks	65 kg	20	1 300 kg
Broccoli	100 kg	20 – 25	2 250 kg
Carrots	200 kg	50	10 000 kg
Beetroot	100 kg	50	5 000 kg
Potatoes	50 – 60 kg	50	2 750 kg
Cabbages	10 – 40 heads	25	625 heads

Source: Swarts, 2009

Eric estimates that half of his produce is sold within the boundaries of the Stellenbosch Municipal Area and the rest within 100 kilometres of his farm.

He sells approximately 40 percent through a CSA programme into the wider Cape Town region and staff boxes at the nearby Sustainability Institute. Eric is planning to redirect his CSA towards an even more local customer base (the Stellenbosch region). Members of Eric's CSA who were interviewed about their experiences of the CSA programme noted that the attraction of the CSA was supporting local farmers and reducing their impact on the natural environment (mostly through reducing carbon footprints) whilst receiving fresh, in season and organic produce (Pieters 2009; Rabkin, 2009). Some of the challenges they identified included learning what to do with seasonal produce (such as learning to curry green beans) and getting accustomed to sometimes limited availability in comparison with what is available from the supermarkets (Dawson, 2009; Swanepoel, 2009). They also noted that they were prepared to pay a premium for good quality local produce over imported produce (Pieters, 2009).

A further 40 percent is sold at the Waldorf School Saturday Farmers' Market and the remaining 20 percent to local restaurants (five restaurants in total). By selling to a diversity of local markets, he builds the resilience of his business in the event of one of his customers withdrawing. Eric is a consciously local orientated farmer and sells his produce to local markets for several reasons. He believes that local demand should be met first, and then produce can be exported. For Eric, selling locally makes sense both in term of lower operating costs and reduced risk. Supplying locally allows him to avoid expensive cold chains and thereby also ensure that his produce arrives fresh. He is able to sell locally through the relationships that he has built with his customers. Many of them have visited the farm and have an increased awareness of issues facing farmers and the food they eat as well as increased respect and value for naturally grown and nutritious fresh produce. His produce is no longer certified organic (which is a prohibitively expense process for many small farmers), because the customers themselves 'certify' the products when they visit him. If he didn't supply local, his customers couldn't visit his farm and they wouldn't have an opportunity to build the critical understanding of the food system that supports them.

Eric also has a deep care for nature, and is organic in his farming methods out of a respect for the soil and the nutrition that organic food provides. The connections between local and organic are difficult to prove, but Eric's sincere respect for his local environment and local community are evident in the way in which he relates with them through the vegetables he grows. Working with soil for Eric is about watching life growing and in turn building a respect for life, thereby creating pride in life, in ourselves and what we do and what we can achieve. "If communities were to become more connected to growing their own food, it is an opportunity for us to become proud people again" (Swarts, 2009).

Threats to local production

The expected impacts of climate change for the Stellenbosch region include increasing scarcity of water resources, with severe impacts on local productive capacity. Demand for potable water resources is expected to outstrip supply by 2017 (Smit, 2009) and irrigation water supplies are expected to run into shortage nationally with severe impacts on the economic viability of agriculture (Benhin, 2006:09). Certain crop types are expected to be impacted worse than others, such as deciduous fruits that require specific minimum temperatures during winter to ensure ripening. Temperature increases during the summer months will adversely affect both production and potential for export. Furthermore, climate change is expected to impact severely on biodiversity and ecosystem services as well as increase the frequency of fires and flooding (Hewitson, 2006; IPCC, 2007; Johnston, 2009). The expected impacts of climate change highlight the importance of protecting water resources, conserving biodiversity and better understanding the role of resources within livelihood security.

The main findings of the current production in Stellenbosch as presented above will be summarised in Section 4.6 (Chapter summary), Section 5.1 (Summary findings) and Section 5.2 (Conclusions), and used to inform the recommendations made in Chapter Five, Section 5.3.

4.3.2 Distribution

Tracking the flows of food in and out of Stellenbosch proved to be a challenging undertaking as much of the information is either not recorded or the information is not openly available. The research methodology for providing a descriptive overview of the distribution component of the Stellenbosch food system is motivated in Chapter Three, Section 3.3.2.2. The findings presented below were selected in order to give an overview of the complexity of the distribution system rather than a detailed account of flows of food.

Export orientated produce

The majority of locally grown produce (namely wine and deciduous fruits) are orientated towards export markets (Louw, 2009:40; SAWIS, 2009:26). The agricultural sector in the Cape Winelands (of which Stellenbosch forms part) is heavily export orientated, whereby the export value of trade and investment in the Cape Winelands District Municipality has increased by over 400 percent (or R4.8 billion) over the past ten years (Louw, 2009:08). Export figures specific to Stellenbosch were not available, but national export of wine was 53.9 percent of total production in 2008 (SAWIS, 2009:26) and an estimated 74 percent of total fruits produced in South Africa are exported (Louw, 2009:50). If these national export ratios are applied to Stellenbosch, it would suggest that 46.1 percent for wines and 36 percent for deciduous fruits remained within the country. Given that Stellenbosch is estimated to produce 86,284 tonnes of wine grapes and 19,239 tonnes of fruits

(Statistics South Africa, 2006), these export estimates would also suggest that of the total 122 974 tonnes of produce being produced from Stellenbosch, 74 220 tonnes or 60.35 percent is being exported out of the country. Stemming from the diversified nature of the system and lack of access to sufficient data, it was not possible to estimate what remains within Stellenbosch to be consumed or what is distributed across South Africa. Section 3.3.2.2 in Chapter Three details the research approach and methodology for determining local distribution, as well as the challenges around access to data that were encountered.

Local fresh produce from farm to retailer

The vegetables, meat and dairy produced locally were found to be distributed mostly within the Western Cape or otherwise nationally. Due to information not being publicly available for the meat and dairy sector, it was not possible to track the flow of livestock products for the purposes of this study. For vegetables, only 4 percent of South Africa's total vegetable production is exported and the majority of the vegetables produced in the Western Cape are consumed locally or nationally (Louw, 2009:50). A large percentage of vegetables are distributed through the national fresh produce markets (estimated at 45 – 50 percent of total fresh produce sales) and the Epping Fresh Produce Market in Cape Town is the nearest national fresh produce market for Stellenbosch, where the majority of its fresh vegetables are both sent to and purchased from (Becker, 2009). It is estimated that the Epping Fresh Produce Market trades approximately 150 million tonnes of vegetables per annum (Louw, 2009:50). Vegetables not sold to the Epping Fresh Produce Market are mostly sold directly to retailers (mostly through pack sheds and central distribution centres) or informal traders, but there are no records available for these sales.

Emerging farmers selling locally

From the interviews conducted with the emerging farmers, it was found that they sell their produce through a variety of markets, including directly to local vendors, pack sheds, retailers or central distribution markets such as the Epping Fresh Produce Market. Whilst it is often difficult for the farmers to transport their produce through to Epping and they don't receive a good price for the produce, they are at least guaranteed to sell their produce. The emerging farmers who sold locally (within Stellenbosch) sold through a combination of:

(i) *Local vendors or door-to-door sales*: for small amounts of produce sold directly to the local community. This system was found to work for small volumes of products only and does not give the farmer a guaranteed sale.
(ii) *Local pack sheds*: that would package the products and then transport them to central distribution points before the produce ends up on the shelves of major retailers such as Woolworths or Checkers. Downfalls included that they did not receive good prices

(although marginally better than at Epping) and there were no guarantees with their contracts.

(iii) *Local retailers*: the Spar store in Stellenbosch actively looked for local farmers and assisted them to get their produce on the Spar shelves by providing support with packaging and logistics as part of a commitment to supporting local (Espos, 2009).

(iv) *Local restaurants*: farmers with high quality organic produce sell small amounts of produce directly to local restaurants. Diversifying their market outlets helps to build the resilience of local farmers.

(v) *Local community initiatives*: through farmers' markets and CSAs (described in Box 2) that sell predominantly organic produce to middle and higher income groups. The prices for organic produce through these initiatives are typically cheaper than organics in the retailers, but more expensive than non-organics. The farmers receive the best price for the produce through this marketing system, but it requires community support and awareness.

From retailers to consumers

In South Africa, four of the largest retailers (Pick n Pay, Woolworths, Shoprite Checkers and Spar) account for over 60 percent of national sales (van Rooyen, 2009). With the exception of Spar and Pick n Pay Family stores, all other major retailers source their produce from central packaging warehouses which in turn have their produce originating either directly from the farmers or from local pack sheds that package the produce. Spar and Pick n Pay Family Stores allow store managers to source their produce directly from local farmers and most stores stock a combination of produce from the central distribution warehouse and locally sourced produce (Engel, 2009; Espos, 2009). From an interview with the local Spar owner and case studies of other Spar initiatives to support local[57], it was found that their support for local producers stemmed from a motivation to support the local community rather than a food miles or carbon footprinting perspective (Louw, Vermeulen & Madevu, 2006; Espos, 2009).

Local vendors and other informal trading markets account for the majority of the remaining sales. Informal vendors sell loose fresh produce and small amounts of basic food produce which are mainly sourced from central distribution markets such as Epping or Kraaifontein where the prices are cheapest (Lebo, 2009). A very small percentage of food is grown by the community itself for

[57] SPAR supermarket in Thohoyandou, Venda actively sources almost all of their fresh produce from local farmers and supports 27 local emerging farmers who supply 30 percent of their fresh produce. The store has captured a large percentage of the local market (66 percent within two years) with an average of 22 500 customers per day, but has working partnerships with local street vendors not to supply products that the vendors rely on for their livelihoods, namely mangoes and tomatoes. The store management is actively involved in capacity building programmes with the local farmers and motivations for supporting local producers include supporting the local community, building a loyal customer base and supplying the freshest produce available (Louw, Vermeulen & Madevu, 2006).

internal consumption. A recent survey by the Department of Agriculture identified eleven community food gardens supported by government initiatives (Murdoch, 2009) and a further ten community based initiatives were found in the Stellenbosch region through personal investigation. The food generated through these initiatives is marginal in comparison to the food consumed from major retailers or informal vendors but plays a critical role in supporting food security at a household level for the families engaged in these food gardens (Mbambalale, 2009; Menze, 2009). A case study is presented below on local food flows.

Box 3: Tracing the story of the local butternut

An investigation was undertaken to trace the journey of a locally produced food item and identify broad patterns in the Stellenbosch food economy. A butternut was chosen as a locally produced and consumed product that can be sold without any processing or as a value added product. No commercial butternut farmers were found in the Stellenbosch region (the nearest commercial farmers of butternuts are located in the Clanwilliam and Villiersdorp regions), (Statistics South Africa, 2006). Several small vegetable farmers (including several emerging farmers) were found to produce butternuts (and a variety of other vegetables).

The local emerging farmers growing non-organic butternuts sell their butternuts through a variety of markets, including directly to local retailers or to the Epping Fresh Produce Market (February, 2009). The prices they are paid are market related, ranging from R1,00 – R4,00 per kilogram depending on the class and season, but typically sold for R2,00 per kilogram at the Epping Fresh Produce Market (de Wet, 2009). Certain retailers, including Fruit and Veg, source their butternuts from the Epping Fresh Produce Market (Coetzee, 2009). Consumers in Stellenbosch in turn pay the prices per kilogram as indicated in Table 14 below.

Table 14. Price of the butternut per kilogram (25th of August 2009)

Name of Retailer	Whole unprepared butternut	Butternut prepared into cubes or sticks
Checkers	R6,49	R19,90
Shoprite	R5,99	R17,90
Woolworths (non-organic)	R8,99	R19,98
Woolworths (organic)	(not available)	R23,98
Fruit and Veg	R5,50	R8,88
Spar	R8,99	R22,98

The two local organic emerging farmers interviewed sell their unprepared organic butternut directly to local consumers at R7.50 (Swartz, 2009) to R12 (Zenzele, 2009) per kilogram through local restaurants, box schemes or at the Waldorf Farmers' Market. Whilst the study does not illustrate clearly the flow of butternuts in Stellenbosch, it highlights some of the complexities of the system and confirms that organic produce is cheaper when sourced directly from the farmer.

It is estimated that the majority of food consumed within Stellenbosch originates from other areas. Cereals and sugars would be entirely sourced from other regions as Stellenbosch does not produce any of its own. Vegetables, fruits and livestock products may originate either from Stellenbosch or from outside of Stellenbosch, but as Stellenbosch consumes more than it is currently producing (summarised in Table 20), it can be inferred that the majority of Stellenbosch's food is brought into the region. The products originating from Stellenbosch will most likely have passed through a distribution centre (such as Epping Fresh Produce Market or a regional retailer distribution centre) which may fall outside of the boundaries of Stellenbosch before returning back to a local retailer. An attempt was made to provide an overview of possible flows of food through the Stellenbosch food system and is shown in Figure 15 below. The flow diagram does not represent volumes or scale of flows of food but rather is an attempt to give an overview of the complexity of the system and the extent to which (1) agricultural produce leaves the country (high level of exports for main produce), (2) food that is grown locally often leaves the region before returning and (3) food for local consumption is predominantly brought in from other regions.

The main findings from a review of the current distribution component of the Stellenbosch food system suggest that the system is determined by price and efficiency for the large retailers who dominate the markets as an overriding decider in all situations. The produce is often transported out of the Stellenbosch region to central distribution points before being sent back to the large retail outlets or to informal traders (Lubbe, 2009; Coetzee, 2009). The main motivation for this was to achieve the economies of scale and diversity required to meet the demands of affordable food with a wide variety of choice as being demanded by consumers (Becker, 2009; Lubbe, 2009; Coetzee, 2009). For small-scale farmers, selling out of Stellenbosch (to packsheds or other buyers) does not always give them a good price for their produce but mostly guarantees them a sale. Selling locally at farmers markets is the most risky for guarantee of sale, in comparison with direct contracts with local retailers (increasing the security of sale) and ideally the CSA system which has strong contracts directly between local producers and consumers at the start of the growing season. In this way, local does not guarantee sale but there are different ways of selling local that may be more suitable for local small-scale farmers than others.

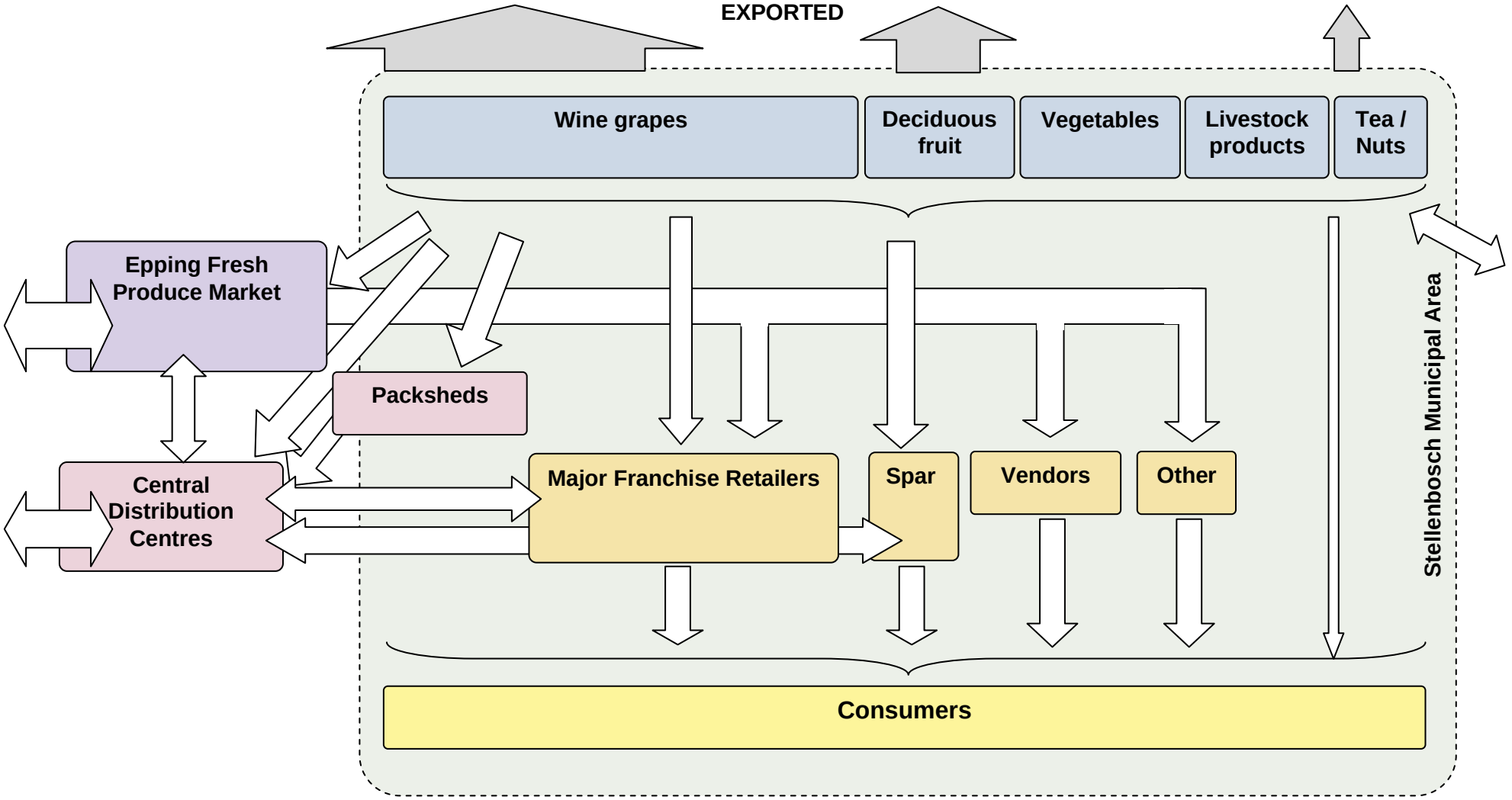


Figure 15: Flow of food in Stellenbosch

The cases of farmers being paid fairer prices were instances where they were connected more directly to the consumer and had a differentiated product (high quality or organic) that people were prepared to pay a premium for (but still received better prices than if they had bought conventional organic). These cases were also actively supported by individuals or organisations who were committed to local or organic or both. The CSA system described in Box 2 provided one of the most supportive systems for the producer through a guaranteed sale at the start of the growing season as well as better prices for the consumers. Other benefits of this locally connected system include the increasing awareness of food related issues by local consumers, an understanding of the challenges being faced by local farmers and a shift away from packaging and excessive use of energy.

The end of cheap oil will impact severely on the Stellenbosch food system that is currently highly dependent on imported food produce or long distribution networks for locally produced food. Currently transport costs contribute to 75 percent of logistics costs within South Africa (Louw, 2009). This will serve to increase the vulnerability of local farmers as both farm production and transport costs rise and they continue to receive marginal shares of the food dollar. Opportunities to grow stronger local food economies will become increasingly apparent and attractive, and are discussed further in Chapter Five, Section 5.2.

4.3.3 Consumption

An overview of current consumption patterns for the community of Stellenbosch was found by weighting the findings of the National Food Consumption Report (Nel & Steyn, 2002) by age group for the Stellenbosch Municipality based on the census findings of the Community Survey 2007 (Statistics South Africa, 2007). The methodology and justification for this research design are given in Chapter Three, Section 3.3.2.3. Using the information provided in Table 15 below, the total number of persons found in the age groups for [0 – 5] were estimated at 17 611, [6 – 9] at 15 899 and [10 +] to be 167 013, with a total population for the region of 200 524.This was done to align the age groups from the Community Survey 2007 with the age groups used for the National Food Consumption Report 2002.

Table 15: Stellenbosch population by age group (2007)

Age group	Number of persons
0 - 4	17,611
5-9	15,899
10-14	18,318
15-19	20,658
20-24	26,262
25-29	18,912

30-34	14,878
35-39	13,892
40-44	11,849
45-49	12,863
50-54	8,023
55-59	7,373
60-64	5,694
65-69	2,921
70-74	2,320
75-79	1,257
80-84	932
85+	861
Total	200,524

Source: Statistics South Africa, 2007

This information was used to weight the average intake by food group as found in the National Food Consumption Report (Nel & Steyn, 2002) and the findings are presented in Table 16 and

below. Limitations of the report are discussed in Chapter Three, Section 3.3.2.3 and further explanation of the different types of methodologies employed for the compilation of the report are also provided.

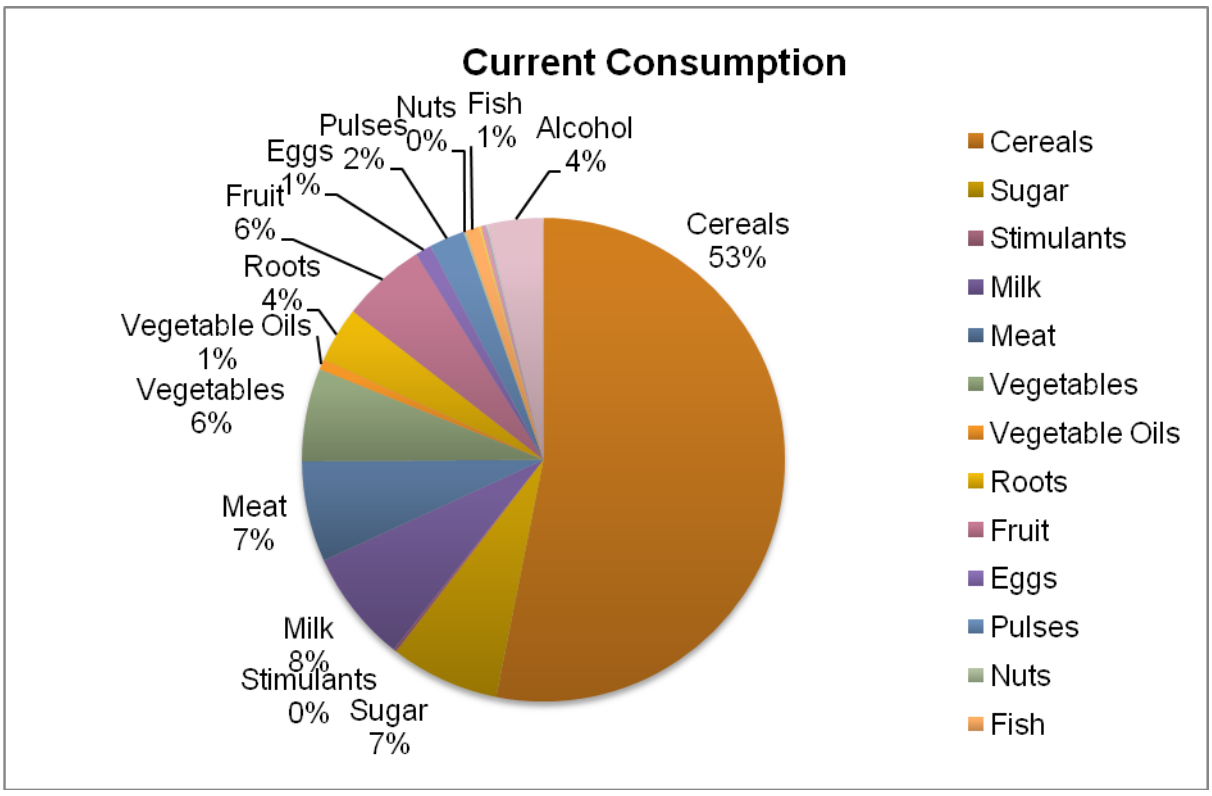


Figure 16: Current consumption by food group for Stellenbosch

Source: Compiled by author from Nel & Steyn, 2002 and Statistics South Africa, 2007

Table 16: Current consumption by food group for Stellenbosch

Food Group	Consumed (kg/year)									Consumed (tonnes/year)
	0 – 5 years		6 – 9 years		10 + years				Total	
	Per child	Total	Per child	Total	M1 per person	M2 per person	Average per person	Total	Total	Total
Cereals	164.21	2,891,963.95	206.19	3,278,190.96	317.36	248.36	282.86	47,241,363.99	53,411,518.90	**53,411.52**
Sugar	23.90	420,906.42	37.32	593,312.52	27.90	47.78	37.84	6,320,001.56	7,334,220.51	**7,334.22**
Stimulants	53.63	944,468.24	65.04	1,034,002.59	139.47	160.83	150.15	25,076,705.50	216,441.41	**216.44**
Milk	45.22	796,431.06	36.97	587,741.51	26.74	47.10	36.92	6,166,687.80	7,550,860.38	**7,550.86**
Meat	16.46	289,839.20	23.22	369,137.42	31.29	41.67	36.48	6,092,621.71	6,751,598.33	**6,751.60**
Vegetables	18.80	331,171.33	21.29	338,554.90	33.77	33.22	33.50	5,594,275.80	6,264,002.03	**6,264.00**
Vegetable Oils	1.70	30,018.83	2.94	46,715.24	2.88	4.54	3.71	619,046.21	695,780.28	**695.78**
Roots	10.65	187,569.48	12.81	203,690.04	14.69	25.41	20.05	3,348,518.79	3,739,778.31	**3,739.78**
Fruit	17.55	308,994.68	21.91	348,362.19	22.38	37.56	29.97	5,005,709.46	5,663,066.34	**5,663.07**
Eggs	3.47	61,066.14	3.65	57,973.32	5.54	6.08	5.81	970,174.34	1,089,213.80	**1,089.21**
Pulses	6.03	106,255.09	8.65	137,476.27	12.71	13.02	12.86	2,148,221.41	2,391,952.77	**2,391.95**
Nuts	0.41	7,263.66	0.72	11,374.14	0.68	0.70	0.69	115,518.72	134,156.52	**134.16**
Fish	2.47	43,581.94	2.67	42,478.95	4.35	5.60	4.98	831,490.92	917,551.81	**917.55**
Human Milk & BMS	9.27	163,335.86	0.00	0.00	0.00	0.00	0.00	304.80	163,640.66	**163.64**
Soups	2.12	37,346.77	2.79	44,393.98	0.93	1.70	1.32	220,064.68	301,805.43	**301.81**
Infant foods	0.71	12,534.63	0.33	5,222.82	0.00	0.01	0.01	1,219.19	18,976.65	**18.98**
Condiments	0.06	1,028.48	0.17	2,669.44	0.18	0.28	0.23	38,099.84	41,797.77	**41.80**
Animal oils and fats	0.04	707.08	0.09	1,508.82	0.38	0.51	0.44	73,761.29	75,977.19	**75.98**
Spices	0.00	0.00	0.01	116.06	0.00	0.00	0.00	0.00	116.06	**0.12**
Supplements	0.05	899.92	0.07	1,102.60	0.02	0.05	0.03	5,486.38	7,488.89	**7.49**
Alcohol	0.04	771.36	0.00	0.00	19.64	25.12	22.38	3737,746.76	3,738,518.13	**3,738.52**
TOTAL										**100,508.46**

Source: Compiled by author from Nel & Steyn, 2002 and Statistics South Africa, 2007

The core findings from the research suggest that the main food groups consumed by weight for the Stellenbosch community are cereals (53 percent), followed by milk (8 percent), meat (7 percent) and sugar (7 percent). Vegetables (6 percent), fruits (6 percent) and roots (4 percent) are also notable food groups according to these findings, as is alcohol (4 percent). The research findings are limited in that they are not based on primary research conducted within Stellenbosch, but rather from a compilation of national studies that reflect national average consumption patterns. Given that the demographic profile for Stellenbosch and the Cape Winelands varies greatly from that of the rest of the country as a result of the different demographic composition (refer to Table 3), these findings may not reflect actual consumption patterns. Furthermore, the study does not allow for variances in income group or local cultural preferences. It is put forward that local residents of Stellenbosch may consume more fruit given their location within a fruit producing region and may also consume more alcohol, given the high prevalence of alcoholism in the region but these cannot be substantiated without further research.

4.4 Towards improved food security

The research revealed high levels of food insecurity in certain districts within the Stellenbosch region and this motivated an investigation into the food requirements associated with a nutritionally optimal diet for the Stellenbosch population given the critical importance of food security in realising sustainable development (Khoza, Troskie and Jacobs, 2009). Furthermore, based on the findings that local food economies promote sustainability (Chapter Two, Section 2.5) and as part of a core recommendation to localise the food economy (to be presented in Chapter Five, Section 5.3), this would require an understanding of local food production requirements to meet local consumption needs. The motivation for investigating nutritionally optimal consumption was that an understanding of the food demands of a nutritionally optimal diet would provide a baseline of what Stellenbosch would need to produce to meet local demand whilst ensuring food security for all.

Current research by the Department of Human Nutrition at the University of Stellenbosch to map food insecurity in the Western Cape was accessed to determine levels of food insecurity for the Stellenbosch region. The research correlated population density with a synthesis of several indicators representing a composite human needs index that might infer food insecurity (detailed in Section 3.3.2.3). The findings of this research are presented in Figure 17 and Figure 18 below.

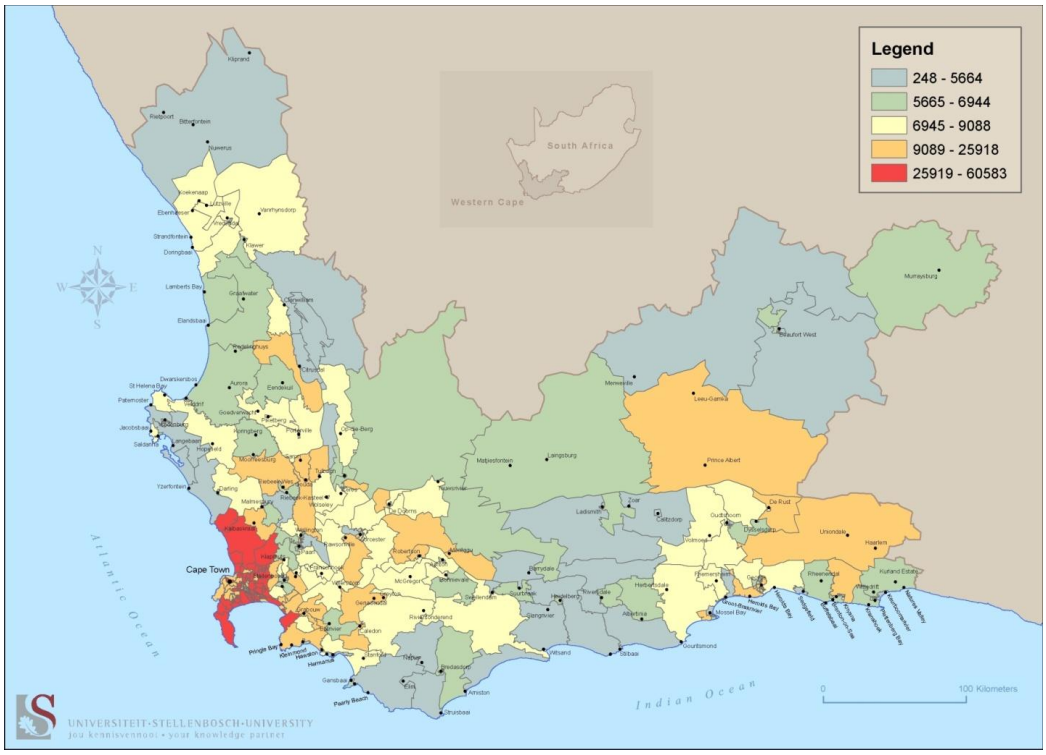


Figure 17: Population density of the Western Cape

Source: van Niekerk, 2009

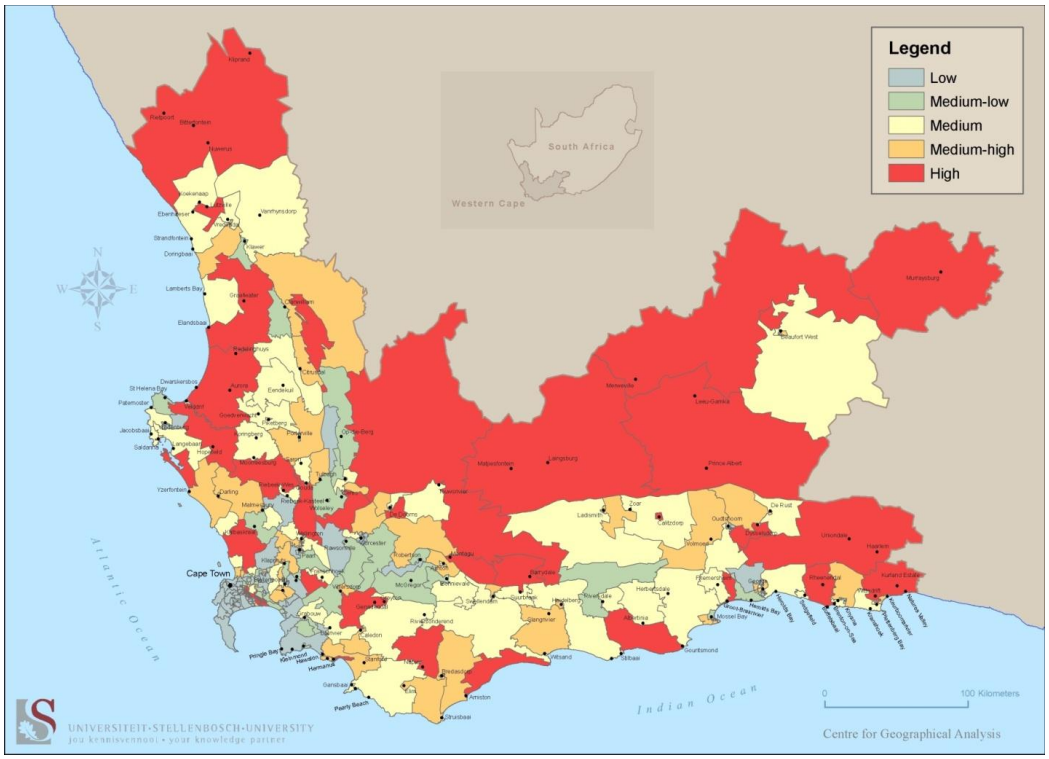


Figure 18: Composite human needs index for the Western Cape

Source: van Niekerk, 2009

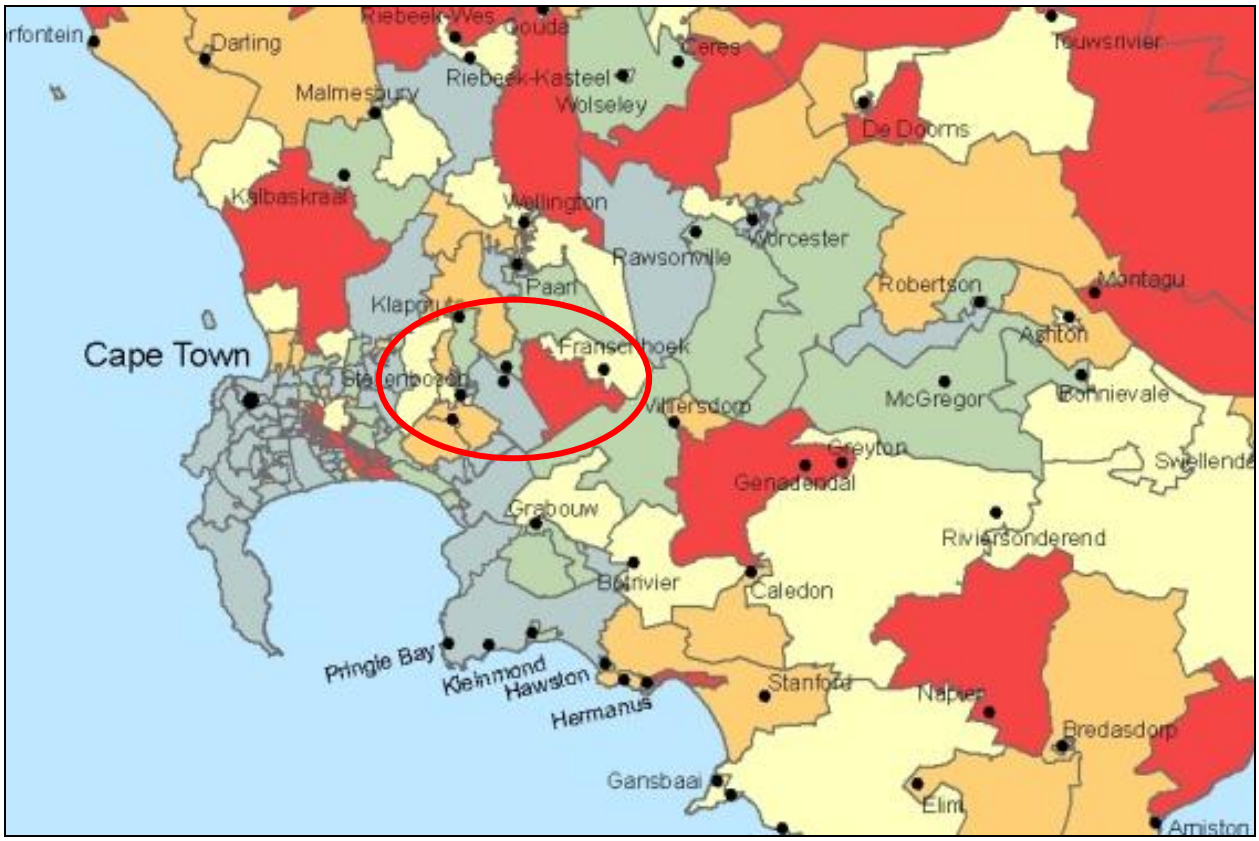


Figure 19: Composite needs index for Stellenbosch region

Source: van Niekerk, 2009

On review of the Stellenbosch region, it was found that the one of the units of study that were identified as having high food insecurity included part of the Stellenbosch Municipal Area, indicated in Figure 19 above. Key issues that contribute to food insecurity have been highlighted in Chapter Two (Section 2.3.4) and a combination of these factors may be at play in the Stellenbosch context. Whilst Stellenbosch is consuming more fresh produce than it is producing (refer to Table 20 for a full comparison), a large volume of fresh produce is still available within close proximity to Stellenbosch including wheat and marine fish that are not produced within Stellenbosch itself. Food security in the Stellenbosch context can be presumed to be currently determined by affordability and not as a result of physical shortage.

The most recent National Income and Expenditure Survey from 2005 / 2006 found that the poorest 20 percent of the nation spend 37 percent of their income on food and non-alcoholic beverages, in comparison with the wealthiest 20 percent who spend 10 percent of their income on food and non-alcoholic beverages (Statistics South Africa, 2008). This survey was completed before the 2008

food crisis saw a sharp rise in the price of basic food produce[58]. It is estimated that poor people may actually spend up to 60-80 percent of their incomes on staple food and the high food prices would have forced these families into conditions of poorer nutrition (Naylor, 2008). With the increasing cost of food as a result of fluctuations in global trade, concentration of market power with major corporations[59] and the rising costs of production linked to fossil fuel dependency, the capacity of families to afford food of sufficient nutritional quality, quantity and diversity is compromised and results in food insecurity (FAO, 2008:28). Simultaneously, farmers are receiving proportionately less for their produce, thereby compromising livelihood security as well (BFAP, 2009:vi). The impacts of poor nutrition manifest in a range of health challenges (such as poor growth, diabetes and heart failure), and coupled with the wider impacts of food and livelihood insecurity, will serve to directly entrench poverty and inequality if not addressed through targeted programmes (McCullum *et al*., 2005:278).

The high levels of food insecurity within a region exporting a large majority of its agricultural produce motivated an investigation into what a nutritionally optimal consumption pattern might look like for the Stellenbosch region and the implications it would have on the total volumes of food required to meet the food security needs of the Stellenbosch population. This would be compared with productive capacity in order to make recommendations for localising food production further in a move towards strengthening the local food economy.

Estimating nutritionally optimal consumption

Working with the same food groups that have been used to estimate current total production and consumption, an attempt was made to infer what a nutritionally optimal diet would be and what implications this would have on the total volume of food required to meet such a diet for the population of Stellenbosch. The research methodology and data inputs used for this section of the research are motivated in Chapter Three, Section 3.3.2.3. The main findings of the nutritionally optimal consumption research are presented in Table 17 and Figure 20 below. For the purposes of the research, only food groups that contribute to the nutritional security of the consumer and can be satisfied through primary production were considered (i.e., not alcohol or sugars nor supplements or condiments).

[58] Food prices increased by over 20 percent on staple food items over the past 12 months (van Rooyen, 2009).

[59] Four major retailers (Pick n Pay, Woolworths, Shoprite Checkers and Spar) in South Africa control more than 60 percent of the market by turnover with concentration of buyer power that limits capacity of small retailers to compete and raises concerns over high food prices for consumers whilst farmers are paid increasingly less (van Rooyen, 2009).

Table 17: Nutritionally optimal consumption by food group for Stellenbosch

Food Group	Consumed (kg/year)						Consumed (tonnes/year)
	0 – 5 years		6 – 9 years		10 + years		
	Per child	Total	Per child	Total	Per person	Total	Total
Cereals	90.34	1,590,933.71	150.56	2,393,793.19	240.90	40,233,431.70	44,218.16
Sugar	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stimulants	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Milk	91.25	1,607,003.75	91.25	1,450,783.75	136.88	22,859,904.38	25,917.69
Meat	4.42	77,886.41	8.85	140,629.83	13.27	2,215,895.08	2,434.41
Vegetables	91.25	1,607,003.75	109.50	1,740,940.50	182.50	30,479,872.50	33,827.82
Vegetable Oils	10.35	182,234.23	12.42	197,422.65	20.70	3,456,417.54	3,836.07
Roots	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fruit	54.75	964,202.25	65.70	1,044,564.30	109.50	18,287,923.50	20,296.69
Eggs	0.00	0.00	13.66	217,164.92	13.66	2,281,235.58	2,498.40
Pulses	10.35	182,234.23	12.42	197,422.65	20.70	3,456,417.54	3,836.07
Nuts	0.00	0.00	12.42	197,422.65	20.70	3,456,417.54	3,653.84
Fish	2.47	43,581.94	2.67	42,478.95	4.35	5.60	831,490.92

Source: Compiled by author from Statistics South Africa, 2007; Harvard School of Public Health, 2009; University of Michigan Integrative Medicine Clinical Services, 2009; USDA, 2009.

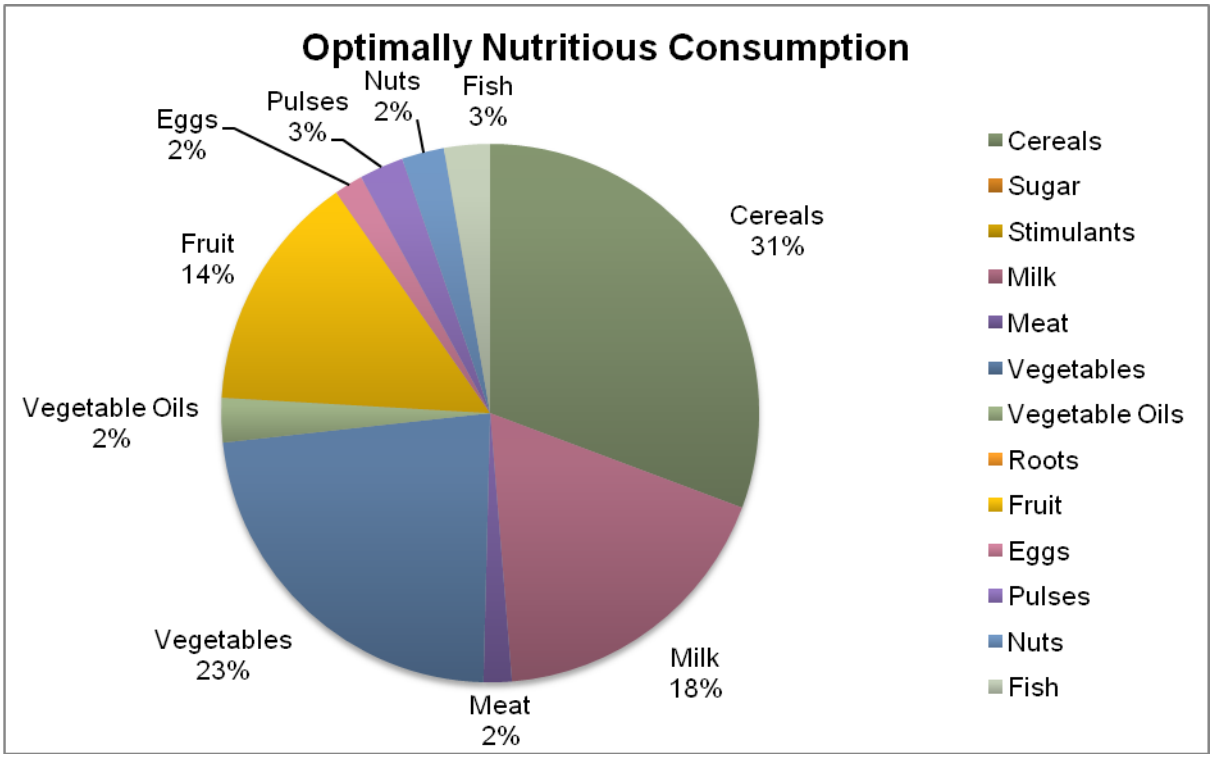


Figure 20: Nutritionally optimal consumption by food group for Stellenbosch

Source: Compiled by author from Statistics South Africa, 2007; Harvard School of Public Health, 2009; University of Michigan Integrative Medicine Clinical Services, 2009; USDA, 2009.

The findings of nutritionally optimal consumption were then compared with current consumption and the results presented in Figure 21 below.

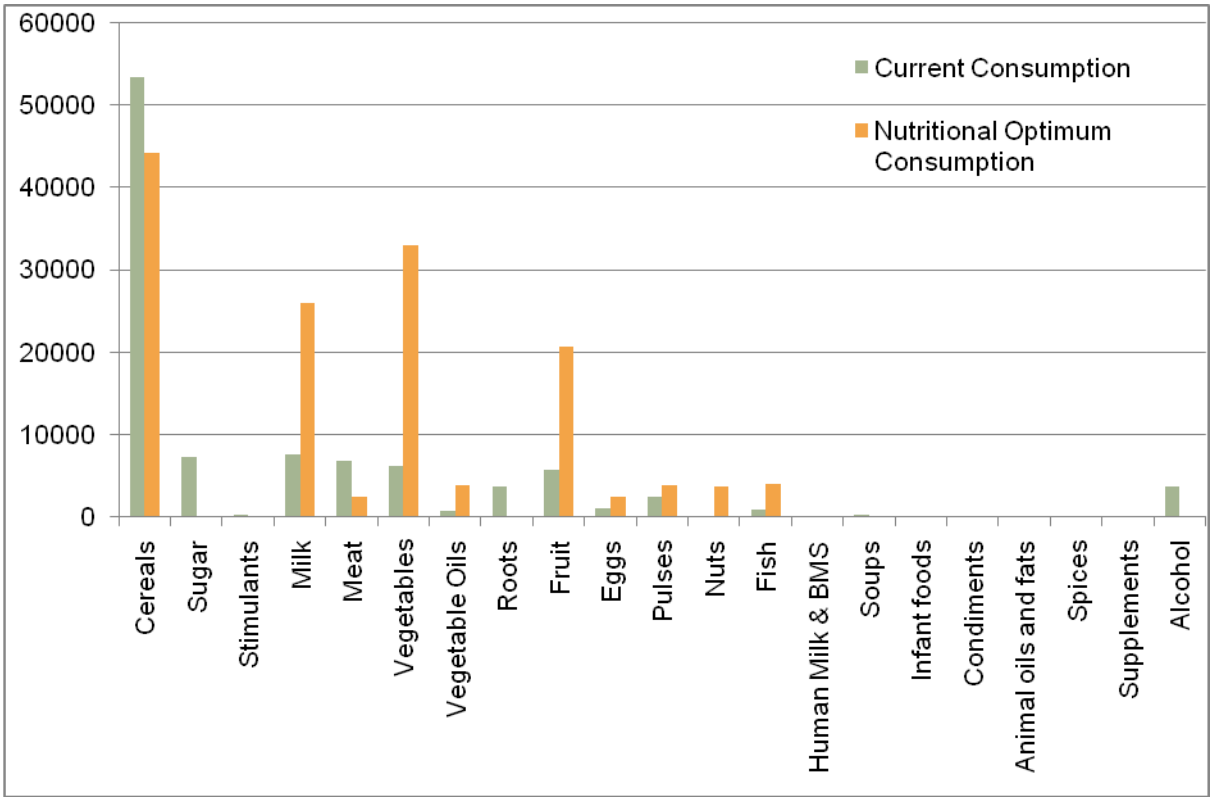


Figure 21: Current vs. nutritionally optimal consumption by food group for Stellenbosch

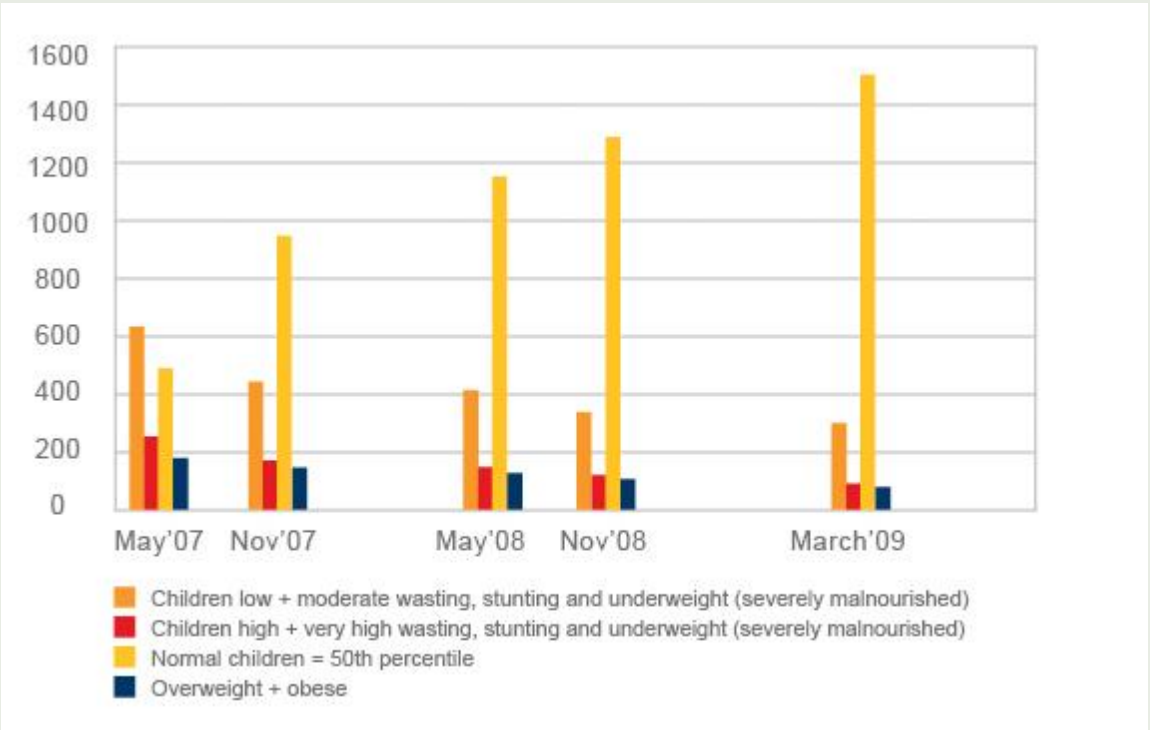
Source: Compiled by author from multiple sources.

The main findings from the comparison of current versus nutritionally optimal consumption suggest that large shifts in both quantity of food being consumed and types of food being consumed would need to take place. The research suggests that less cereals and meat should be consumed, whilst our diets should consist of considerably more vegetables, milk and fruit as well as pulses, fish, nuts, vegetable oils and eggs. Furthermore, the research findings suggest that the volumes of food being consumed by weight should also increase (refer to Table 20 for comparison of total volumes). This has important implications on food security strategies going forward which should be linked to increasing local production of key nutritional crops (such as fruit or vegetables). There are a number of small initiatives emerging in Stellenbosch to address food security at a community level through local production, and one of these initiatives is documented in Box 4 below.

Box 4: Stellenbosch Community Development Programme

Community based initiatives such as urban agriculture programmes or school feeding schemes have critical roles to play in promoting food security for the most vulnerable communities. The Stellenbosch Community Development Programme (a non-profit trust in Kayamandi Township, Stellenbosch) has had enormous success in increasing levels of nutrition and wellbeing of the students from the two primary schools in Kayamandi, as well as their wider families, through several targeted programmes. The focus of the initiative is improved nutrition for children, with the motivation that "better nutrition is a prime entry point to ending poverty and a milestone to achieving a better quality of life" (SCDP, 2009).

Since the programme's launch in 2006, the number of both malnourished and overweight children has decreased dramatically (shown in Figure 22 below) and the number of children that the programme reaches continues to grow. Today, they feed over 900 school children a daily meal as well as provide monthly food parcels for the poorest families, support an urban food garden for the unemployed mothers and provide an extensive nutrition education programme. The awareness programme focuses not only on teaching children in the classroom, but also on educating teachers and building awareness with local vendors on the importance of nutritious food.



The fifty women who are part of the urban food gardens project meet for a few hours on Tuesday and Thursday mornings to work together in the small food garden that supplies each of their families with fresh vegetables on a weekly basis. The garden is built in old car tyres that are donated by a local tyre company with seedlings and compost donated by a local wine estate. Most of the women are from the Eastern Cape, a predominantly rural province, and already have the skills to run a food garden. They estimate that about 40 percent of the vegetables their families consume come from the vegetable garden, with more volume and diversity in the summer months. The gardeners have security challenges as the fence is often broken and their produce stolen. The women also receive a monthly food parcel of dry products to assist with feeding their households. The women find the garden very "helpful to them" as they don't have the place in their own homes for such a garden and by working together, they can share their produce equally and benefit from a diversity of crops. Also, the bi-weekly gardening mornings are an opportunity for the women to come together and socialise with purpose – an opportunity that they would not have had otherwise (Mbambalale, 2009; Menze, 2009).

4.5 Potential productive capacity

In order to identify opportunities for increasing local food production, the next section of research aimed to calculate land requirements in order to meet both current and nutritionally optimal consumption for the entire Stellenbosch population, and to compare these findings with current and potential land use. Demand for food (both current and nutritionally optimal consumption) is converted into equivalent hectares of land requirements. This is compared with current land use, potential productivity of the region and land availability.

Land requirements for local food consumption

The amount of land required to produce enough food from within Stellenbosch to meet local demand has been calculated for both current and nutritionally optimal consumption, and is presented below in Table 18. The methodology for productivity ratios based on crop yields from the region is provided in Chapter Three, Section 3.3.2.1. Food groups that are entirely unsuitable to production in the region (e.g., sugar) or derived from primary produce (where it is not possible to accurately estimate land use) were not included in the land use requirement calculations.

Table 18: Land requirements

Food Group	Current consumption		Nutritionally optimal consumption	
	Total (tonnes / year)	Required (ha)	Total (tonnes / year)	Required (ha)
Cereals	53,412	5,341	44,218	4,422
Sugar	7,334	n/a	0	0
Stimulants	216	n/a	0	0
Milk	7,551	8	25,918	2,013
Meat	6,752	10	2,434	4
Vegetables	6,264	313	32,901	1,645
Vegetable Oils	696	696	3,836	3,836
Roots	3,740	n/a	0	0
Fruit	5,663	126	20,709	460
Wine grapes	0	0	0	0
Eggs	1,089	0	2,498	0
Pulses	2,392	199	3,836	320
Nuts	134	27	3,654	731
Fish	918	n/a	3,982	n/a
Human Milk & BMS	164	n/a	n/a	n/a
Soups	302	n/a	n/a	n/a
Infant foods	19	n/a	n/a	n/a
Condiments	42	n/a	n/a	n/a
Animal oils and fats	76	n/a	n/a	n/a
Spices	0	n/a	n/a	n/a
Supplements	7	n/a	n/a	n/a
Alcohol	3,739	n/a	n/a	n/a
TOTAL	**100,508**	**6,720**	**143,987**	**13,430**

Source: Compiled by author from multiple sources.

A key finding from the research results suggest that a total of 6,720 hectares are required in order to meet current consumption. This consists of 6702 hectares arable land for cereal (by far the largest), vegetable, vegetable oil, fruit, pulse and nut production and 18 hectares of grazing land for meat, milk and egg production. The low figures recorded for required land for current consumption of meat, milk and eggs are based on the low consumption of milk and a conversion factor of land to livestock based on chicken[60]. Not included in the table, but also calculated in the

[60] Chicken was used for comparative purposes as chicken is the preferential livestock for meat production under nutritionally optimal consumption. If current consumption of meat were to be converted based on consumption of beef, it would require a total 3689.83 hectares.

research, was the equivalent cubic meters of water required to produce fresh water fish. For current consumption, this would amount to 91 755 cubic meters.

For nutritionally optimal consumption, considerably more land would be required than for current consumption patterns. The majority of this would be arable land (11 414 hectares) for cereal, vegetable, vegetable oil, fruit, pulse and nut production. More grazing land would also be required (2 017 hectares), especially for the increased production of milk that is estimated to be necessary. The total volume of water required for trout farming in fresh water is estimated at 398 199 cubic meters. The next section will assess land capacity and productive potential for increasing local production in order to meet local demand.

Land condition and productive potential

A Land and Soil Specialist Study on the Cape Winelands District Municipality by Lanz (2007) found that the soils in the Cape Winelands (including Stellenbosch) are of low agricultural potential and agricultural production would be threatened by further damage to the land. Degradation to date has resulted from poor agricultural practices (resulting in salinisation) and contamination by polluted waters. The combination of soils and climate are, however, identified in some areas as highly suitable for vineyards, olives or deciduous fruit. Suitable land is mainly concentrated in the western parts of Stellenbosch which are more developed, and high potential agricultural land is being further lost due to growing pressure from housing and tourism developments. A key finding of the study was that the hotter and drier weather condition expected as a result of climate change will further reduce both land capability and crop suitability of the region (Lanz, 2007:05). A further major constraint identified is the availability of water and sufficient water rights in the Stellenbosch region (du Plessis, 2009), which indicates the importance of appropriate farming methods and water storage from the wet winter months.

The findings on land capability[61] for the Stellenbosch region from the Agricultural Geo-referenced Information System of the National Department of Agriculture (AGIS, 2009) are summarised below in Figure 23 and Table 19.

[61] "Land Capability, determined by the collective effects of soil, terrain and climate features, shows the most intensive long-term use of land for rain-fed agriculture and at the same time indicates the permanent limitations associated with the different land-use classes" (AGIS, 2009).

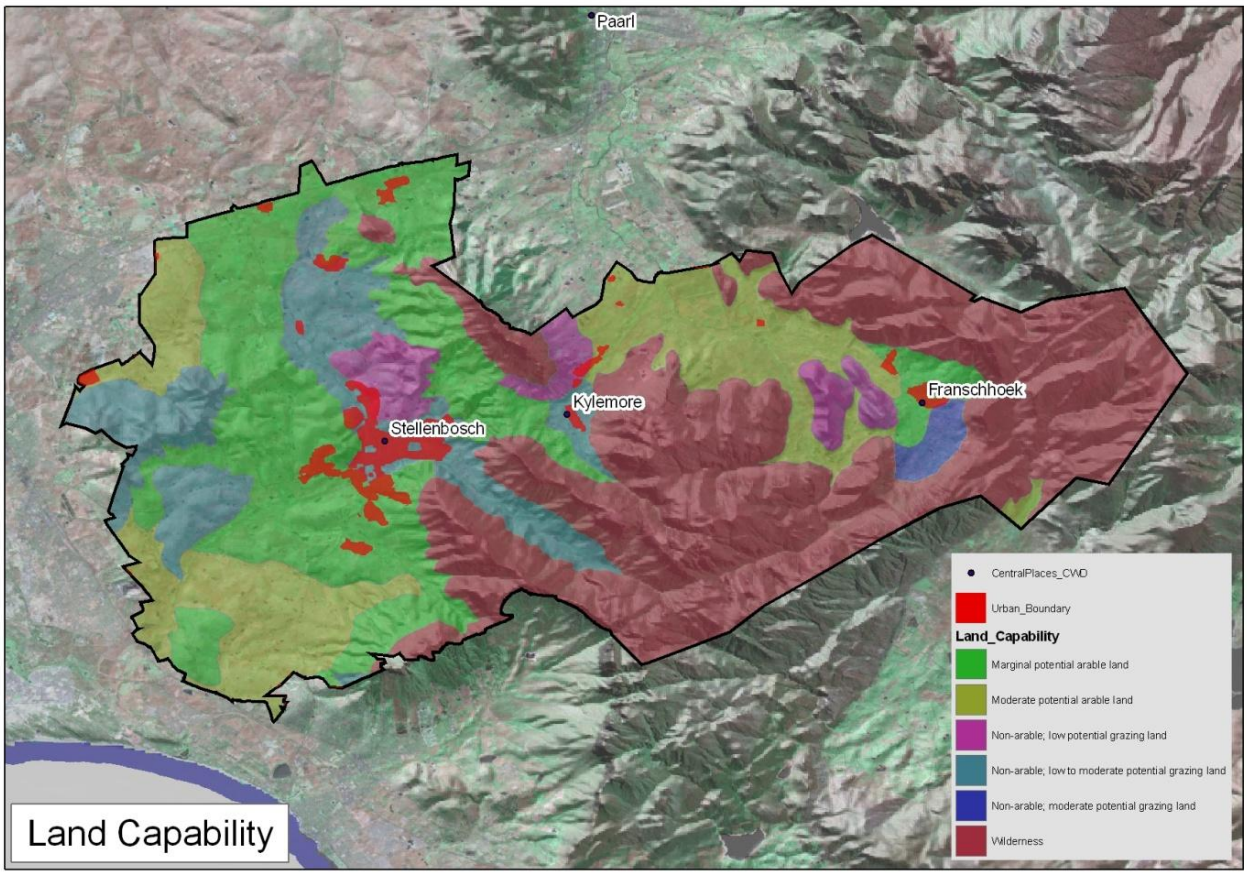


Figure 23: Land capability

Source: Herd, 2009.

Table 19: Land Capability

Land Capability	Perimeter (km)	Area (km^2)	Area (ha)
Marginal potential arable land	220.35	210.41	21,041.12
Moderate potential arable land	190.08	141.61	14,160.59
Non-arable; low potential grazing land	56.50	34.45	3,444.69
Non-arable; low to moderate potential grazing land	151.58	104.42	10,441.72
Non-arable; moderate potential grazing land	13.13	7.83	783.33
Wilderness	228.36	332.41	33,241.29
TOTAL		**831.13**	**83,112.74**

Source: Herd, 2009

These findings suggest that there is sufficient moderate potential arable land to meet both current and nutritionally optimal consumption demand for cereals, vegetables, vegetable oils, fruit, pulses and nuts. There is also sufficient low to moderate potential grazing land for milk, meat and egg production in both current and nutritionally optimal consumption scenarios to meet local demand (even in the scenario of total beef consumption for the meat component of current consumption).

This suggests that Stellenbosch has the potential to grow enough of its own food to meet local demand and ensure food security through local production with effective agricultural practices without compromising wildernis protection or effectively controlled urban growth. Currently however, a large proportion of this land is under vineyard for wine production and is increasingly under pressure from housing developments. A key question is raised again on the suitability of wine production in the context of food but also livelihood security for the region and will be discussed further in Chapter Five, Section 5.2.

It is important to note that urban agriculture has a potential role to play in increasing the production of vegetables and fruit further for the Stellenbosch region whilst promoting urban greening and the associated positive effects as well as both food and livelihood security (described in Section 2.5.1). If a modest 10 percent[62] of the urban footprint of Stellenbosch (231 hectares of the total 2 313 hectares) were to be converted into urban vegetable gardens, the urban areas of Stellenbosch could potentially produce 4 620 tonnes of vegetables alone. This is at commercial rates of 20 tonnes per hectare productivity (Hygrotech, 2009). Urban food gardens are estimated to be anything between 2 – 16 times more productive than conventional commercial mechanised farms[63] (Hopkins, 2000:206), and as such, could potentially produce enough vegetables to meet all current demand for vegetables per annum (6 264 tonnes) and significantly contribute to increasing consumption of vegetables on the path towards nutritionally optimal consumption (32 901 tonnes per annum). Urban agriculture programmes that allow poor and vulnerable groups access to land and basic inputs have a significant role to play in contributing to local food security (Companioni *et al*., 2002:222). A recent study by Maunder and Meaker on the current and potential contribution of home-grown vegetables to diets in South Africa (2007) found that "intervention which combined production of vitamin A rich crops in home gardens with nutrition education and growth monitoring, showed vitamin A intakes increased above required levels" (Maunder & Meaker, 2007:401). There are multiple benefits that can be realised through food garden allotments and community food gardens that should be seriously considered as a means of addressing food security and building stronger local food economies in the Stellenbosch context.

[62] 10 percent was selected as a conservative conversion rate for urban areas in Stellenbosch which include several suburbs with large amounts of open space available in backyard gardens. Further investigation should be undertaken to establish a more feasible estimate of productive potential for urban zones in Stellenbosch.
[63] Figures stated for United States production rates.

Table 20: Summary of the Stellenbosch food system

Food Group	Current production					Current consumption			Nutritionally optimal consumption		
	Commercial (kg / year)	Emerging (kg / year)	Total (kg / year)	Total (tonnes / year)	Area (ha)	Total (kg / year)	Total (tonnes / year)	Required (ha)	Total (kg / year)	Total (tonnes / year)	Required (ha)
Cereals	0	0	0	0	0	53,411,519	53,412	5,341	44,218,159	44,218	4,422
Sugar	0	0	0	0	0	7,334,221	7,334	n/a	0	0	0
Stimulants	43,000	0	43,000	43	361	216,441	216	n/a	0	0	0
Milk	6,486,298	0	6,486,298	6,486	504	7,550,860	7,551	8	25,917,692	25,918	2,013
Meat	2,158,164	0	2,158,164	2,158	577	6,751,598	6,752	10	2,434,411	2,434	4
Vegetables	5,211,000	105,1625	6,262,625	6,263	424	6,264,002	6,264	313	32,901,107	32,901	1,645
Vegetable Oils	0	0	0	0	0	695,780	696	696	3,836,074	3,836	3,836
Roots	0	2,750	2,750	3	1	3,739,778	3,740	n/a	0	0	0
Fruit	19,233,000	6,000	19,239,000	19,239	2,143	5,663,066	5,663	126	20,709,158	20,709	460
Wine grapes	86,284,000	0	86,284,000	86,284	8,924	0	0	0	0	0	0
Eggs	2,418,424	0	2,418,424	2,418	0	1,089,214	1,089	0	2,498,400	2,498	0
Pulses	0	0	0	0	0	2,391,953	2,392	199	3,836,074	3,836	320
Nuts	25,000	0	25,000	25	2	134,157	134	27	3,653,840	3,654	731
Fish	55,000	0	55,000	55	0	917,552	918	n/a	3,981,990	3,982	n/a
Human Milk & BMS	0	0	0	0	0	163,641	164	n/a	n/a	n/a	n/a
Soups	0	0	0	0	0	301,805	302	n/a	n/a	n/a	n/a
Infant foods	0	0	0	0	0	18,977	19	n/a	n/a	n/a	n/a
Condiments	0	0	0	0	0	41,798	42	n/a	n/a	n/a	n/a
Animal oils and fats	0	0	0	0	0	75,977	76	n/a	n/a	n/a	n/a
Spices	0	0	0	0	0	116	0	n/a	n/a	n/a	n/a
Supplements	0	0	0	0	0	7,489	7	n/a	n/a	n/a	n/a
Alcohol	0	0	0	0	0	3,738,518	3,739	n/a	n/a	n/a	n/a
TOTAL	**35,629,886**	**1,060,375**	**36,690,261**	**122,974**	**12,935**	**100,508,462**	**100,508**	**6,720**	**143,986,907**	**143,987**	**13,430**

4.6 Chapter summary

The research findings suggest that Stellenbosch is currently producing export orientated agricultural produce whilst food insecurity is a serious challenge to local communities. Food security rests not only on sufficient food, but also sufficiently nutritious and diverse food. As such, an investigation found that Stellenbosch could potentially produce enough food locally to provide the entire population with a sufficiently nutritious and diverse diet but this would require careful consideration of limitations such as water availability. It was established that urban agriculture could play a significant role in increasing the contribution of fresh vegetables at affordable rates to local residents. Several case studies found that local food movements are able to distribute food from producer to consumer in a way that promotes both food and livelihood security with reduced environmental impacts. The success of these initiatives rests on civil society mobilisation, awareness building and education. It is recognised that wine production does provide direct and indirect employment that supports a large percentage of the Stellenbosch population. The current trajectory of Stellenbosch's food system appears to be inherently unsustainable through a predominantly modern agricultural approach towards export markets, not making significant progress towards transformation and alarmingly vulnerable through a large dependency on imported food produce. Discussions will be presented in Chapter Five on best land use for Stellenbosch in the context of food and livelihood security as well as long term sustainability.

Chapter Five: Conclusions & Recommendations

The final chapter will provide an overview of key findings by research objective, including conclusions on the current state of food production, distribution and consumption in Stellenbosch as well as the benefits and limitations of building a stronger local food economy to promote sustainability in the Stellenbosch context. Key recommendations will be presented in response to the third research objective, (iii) to recommend measures which can be taken to promote greater sustainability through Stellenbosch's food system. Opportunities for further scholarship that have been identified through the research process and findings will be presented.

5.1 Summary findings

The summary findings are presented by research objective:

5.1.1 First research objective

The first research objective was to investigate the benefits and limitations of local food economies in promoting sustainability. The key finding of the literature review is that local food economies tend to promote greater sustainability by shifting the decision making around the food system back to the communities in which they are embedded. Local food economies promote increased accountability through reconnecting consumers to the food system that supports them, and thereby increasing the potential of internalising the social and environmental costs that directly affect their communities. Local food economies have multiple social, environmental and economic benefits for local communities in the long term which actively promote community development and resilience. In the short term, local food economies require active support from civil society in order to compete with the subsidised modern food system that is highly effective at supplying cheap food (with multiple associated social and environmental impacts). In the context of the end of cheap oil and growing awareness about the impacts of the modern food system, is it put forward that food systems will increasingly tend towards localisation. The key findings from the research presented in support of the first research objective leads to the conclusion that local food economies promote greater sustainability than the current modern food system, and that building a stronger local food economy for Stellenbosch would promote greater sustainability.

5.1.2 Second research objective

Based on the findings of the first research objective, the investigation for the second research objective (to build an understanding of the current status of local food production, distribution and consumption in Stellenbosch) was critical in establishing current practice and a baseline for making recommendations to build a stronger local food economy through the final research objective. Key findings of the research undertaken in support of the second research objective are presented below.

The findings of the research suggest that the majority of Stellenbosch's production is towards export orientated markets (wine grapes and deciduous fruits), and over 60 percent of produce originating from the Stellenbosch region is estimated to leave the country. The remaining fresh produce is sold through a diversity of networks both locally and nationally. Fruits and vegetables grown in the Stellenbosch region that are not exported are mostly processed through central distribution markets or warehouses to large retailers who dominate the local market.

Key challenges for local producers include vulnerability to fluctuations in global food trade that affect the export orientated produce from the region and the jobs that depend on those markets, and leave local producers who supply locally (such as most vegetable and certain fruit producers) to compete with imported produce. Small farmers often compete with other local small farmers to find markets for their produce. Furthermore, farming can be prohibitively expensive for emerging farmers who cannot break into the system and out of debt. Often, these farmers will realise greater returns by selling their land than continuing to farm (Parks, 2009). Limited availability of water is the largest constraint for farming activities in the region with available water supplies expected to decrease under conditions of climate change.

There are several key threats facing the local production system in the immediate future, including the impacts of climate change, dependency on fossil fuels and increasing urban sprawl through development linked to population growth. The local production sector is further vulnerable to fluctuations in global trade through its focus on export orientated markets.

5.1.3 Third research objective

The final research objective was to recommend measures to promote greater sustainability through Stellenbosch's food system based on the research conducted through the first and second research objectives. The research presented in support of the third and final research objective aimed to provide the inputs for making recommendations for building a stronger local food economy in Stellenbosch.

The research revealed that areas within Stellenbosch are experiencing food insecurity (van Niekerk, 2009) and based on the importance of food security in realising sustainable development (FAO, 2008), research was undertaken as to what a nutritionally optimal consumption would mean for food demand and land requirements if a stronger local food economy were to be built. A shift in diet towards a nutritionally optimal diet would infer reduced consumption of cereals and meats, and increased consumption of vegetables, milk and fruit. Whilst Stellenbosch residents are not expected to shift towards a nutritionally optimal diet (with barriers such as cultural preferences, accessibility and affordability included), there is potential for targeted programmes to increase the relative volumes of nutritious fresh produce being consumed in the Stellenbosch community's diet including but not limited to school feeding schemes and community food gardens.

Stellenbosch has the potential to grow all of the food required to meet local demand based on both current and nutritionally optimal consumption (but is limited in its capacity to grow certain crops currently consumed such as roots, sugar cane, rice or tropical fruits). Whilst the soils in certain areas of Stellenbosch are degraded (Lanz, 2007), there is sufficient moderate potential land available for food production (DLA, 2008) and it is possible to rehabilitate degraded soils through agroecological methods of production (Pretty, 1995). There is a question around the suitability of the region for growing cereals in the context of current and future water scarcity, and further investigation is required into the suitability of certain arid climate cereals. If the region of study were increased, this could include the production of cereals and fishing of marine fish into the foodshed.

Urban agriculture could potentially contribute to a large increase in the consumption of fresh produce at affordable prices for local residents. An extensive knowledge base with experienced and skilled producers, supported by major learning institutions, is already established in Stellenbosch and the area is an internationally renowned tourism destination as a result of agricultural practices. The local agricultural system already supports a strong secondary economy of agricultural businesses and there is potential for strengthening the local food economy through building on the resources and reputation of the region.

Wine grape production currently dominates local production and a large majority of arable land in Stellenbosch is currently under vine. Whilst wine production in the region contributes significantly to employment (both directly and indirectly), the quality and security of the employment is less evident. Emerging small-scale farmers have a critical role to play in supporting both local food and livelihood security. A discussion is presented in Section 5.2.3 on determining best use of land for the Stellenbosch region.

Local food initiatives have been shown to not only be financially viable for local producers but actively supported by local consumers because of their multiple social and environmental benefits.

Local food initiatives tend to be supported by consumers within middle to high income brackets where the consumers are prepared to pay a premium for quality produce and support local as well. Food security programmes, such as urban agriculture and feeding schemes, are shown to play a critical role in promoting local food security across communities with comparatively small inputs and should be supported further. The findings of the research suggest that experiences with local food initiatives are drivers of greater awareness and change around social and environmental issues. Community connections and the building of social capital play a critical role in overcoming barriers of economies of scale and global competition associated with the modern food system.

Stellenbosch has a well established local market for fresh produce which continues to grow through the expansion of the retail and hospitality sectors. Unlike other agricultural regions with low population densities, the medium population density with high inequality does mean that there is a strong demand for produce across all income brackets from niche products to mass markets. There is a large potential for food processing and value adding in the region[64]. Value adding could also serve as an opportunity for employment generation for off-season casual labourers. Furthermore, there are opportunities for agri-tourism that would give visitors the unique 'flavour' of Stellenbosch.

Despite the myriad of challenges within the local production system and tough competition from both local and international producers, there are opportunities for promoting a stronger local food system through increasing local food production and connecting consumers more directly in Stellenbosch. The Stellenbosch Municipality owns large portions of land within Stellenbosch, held as municipal commonage, that are in the process of being made available to emerging farmers for agricultural production on long term leases[65]. There is significant potential for increasing local food production through a land reform programme (given the contribution of emerging farmers to local food security as highlighted above), but this would require significant institutional support to overcome the multiple barriers currently being experienced by emerging farmers. An argument is presented that, in the context of the end of cheap oil, measures will have to be taken to increase local production in order to avoid rising food prices linked to rising fossil fuel prices.

5.1.4 Section summary

The above findings on the current status of Stellenbosch's food system and the potential to promote a stronger local food economy are summarised in Table 21 below through a SWOT[66] analysis.

[64] Only 28 percent of agricultural exports from South Africa are currently processed (CWDM, 2007).
[65] Personal experience through professional work on land reform in Stellenbosch Municipality (2009).
[66] SWOT: strengths, weaknesses, opportunities and threats analysis

Table 21: SWOT analysis on potential for building stronger local food economy in Stellenbosch

Strengths	Weaknesses
· Adequate soils and climate · Supportive knowledge institutions · Established tourism · Strong secondary economy · Demand from growing consumer base	· High land value · Low margins of return · Encroaching development · Global and local competition · Prohibitive entry costs for emerging farmers · Limited availability of water
Opportunities	**Threats**
· Land reform on municipal commonage · The end of cheap oil · Demand across sectors · Niche products and high yield crops · Value-adding · Agri-tourism	· Climate change · Dependency on fossil fuels · Fluctuations on global markets

Based on the research findings presented above, core conclusions will be drawn in Section 5.2 and key recommendations put forward in Section 5.3.

5.2 Conclusions

The are four core conclusions that have been drawn from the research, including the value of local food economies in promoting sustainability, the importance of food security for sustainability, the challenge of determining best land use in Stellenbosch and the impact of the end of cheap oil on facilitating a transition towards sustainability through localisation.

5.2.1 The value of local food economies in promoting sustainability

The current global polycrisis (including impacts as a result of the functioning of the modern food system) is impacting negatively on the sustainability of communities, and counter movements are emerging in response to these impacts. The findings of the literature review clearly established the benefits and limitations of local food economies in promoting sustainability over the current modern food system. Supported by the findings of the case studies that were documented (in Box 2 and Box 4), it is put forward that local food economies have a greater tendency to promote sustainability. A core conclusion is that the success of both local food initiatives and food security initiatives in the local context has been as a result of strong support from individuals and organisations committed to community development. Within Stellenbosch there is a small but growing local food movement, with strong support from the local community and a large potential for growth.

5.2.2 Food and livelihood security for sustainability

A core conclusion is the importance of both food and livelihood security for the sustainable development of local communities. The literature review established the critical importance of agriculture and the food system in supporting livelihoods (IAASTD, 2008:14) as well as food security in the context of the recent global food crisis of 2008 (FAO, 2008). Stellenbosch is experiencing challenges of both food and livelihood security on a local level, and priority should be given to addressing these challenges through sustainability on the path towards development. Land reform is identified as critical to support emerging farmers with access to land and ongoing support not only for local livelihood but also local food security. Support from food garden allotments and community food gardens also has potential for promoting food security at a community level. These and other components of strengthening the local food economy have been shown to promote community resilience and economic development.

5.2.3 Determining best land use for Stellenbosch

A key issue raised by a comparison of current production versus consumption (both current and nutritionally optimal) is the large output of wine grapes for export and the dependency on imported cereals for consumption. The appropriateness of growing wine grapes for export is considered in the context of the high levels of food insecurity that exist within the Stellenbosch region and dependency on imported produce (from neighbouring regions) with rising fuel costs.

The wine industry has a critical role to play in supporting the local economy and providing employment (both directly and indirectly). In 2002, the wine industry is estimated to have contributed over R16 billion to the national GDP, with a further R6 billion linked to the tourism sector. The wine industry is considered to generate approximately 260 000 jobs in the South African economy, with close to one fifth through wine tourism alone (SAWIS, 2009). Whilst farm workers in the Western Cape are paid higher on average salaries than in the rest of the country, their salaries are still low and those for seasonal workers are even lower and less stable (Statistics South Africa, 2006).

Furthermore, the prices received by wine producers have declined or remained constant since 2003 as a result of growing international competition which, when coupled with increasing costs in production and packaging, are resulting in reducing farm viability (Willemse, 2006 in Louw, 2009). These trends threaten both employment and the wider communities that depend on the wine industry for livelihoods. The impacts of climate change on producing quality wines is a further concern, and areas on the Helshoogte Pass towards Franschhoek are already shown to be experiencing the impacts of climate change (Louw, 2009).

Food production by emerging farmers cannot simply be compared with wine production by commercial estates as both are highly complex and case specific. This is therefore not an argument to replace commercial wine estates with emerging vegetable farmers but rather a conclusion that further investigation is warranted into appropriate land use for the region. There are a number of issues that would need to be considered including water availability[67] and impact on secondary industries (including the tourism sector supported by wine production). It is rather put forward that food production by emerging farmers should be strongly considered as part of a solution towards local food and livelihood security. The suitability of the local soils and climate in conjunction with the needs of the local community for food and livelihood security should be considered when assessing best land use in Stellenbosch.

This presents an opportunity for reconsidering appropriate land use. Non-viable wine estates should be reconsidered for other agricultural purposes. This does not necessarily equate into vegetable production given the soils, climates and availability of water. Much of the land in Stellenbosch currently under vineyard is suitable for deciduous fruit, olive, nut or even livestock production that could contribute to local food security where the local demand will always remain high. Recommendations are put forward to enhance the competitiveness of local wine estates on the global market by focussing on high quality and niche products (Louw, 2009) and diversifying into food production where possible and especially where wine production is not economically profitable. Other measures include on-farm diversification, not just through agri-tourism but also through production of a variety of food and other cash crops.

An investigation should also be undertaken to assess the potential for locally appropriate cereal crops (such as sorghum or other arid climate cereal crops) to meet local cereal demand, given its suitability to dry climates (and therefore reduced demand on water reserves). Stellenbosch may not be able to produce all the cereal requirements to meet local demand and will remain dependent on imports from neighbouring regions unless the extent of the foodshed were to be increased to include other municipalities that do produce cereals. There are questions currently being raised about the suitability of these wheat producing neighbouring regions (such as Malmesbury) to produce cereals given concerns around water scarcity. The cereals challenge remains one that requires further investigation, but a recommendation is put forward to reduce production of wine grapes for export on non-viable farms or to diversify farms in favour of high quality or niche wines combined with production of crops and livestock for local consumption. This would reduce risk for the farmers, boost the local economy with the food dollar being recirculated and not exported out, and increase the diversity of crops being farmed within the region. Opportunities for the

[67] For example, vegetable production requires up to five times more water than wine grape production in the Stellenbosch region (du Plessis, 2009).

recirculation of nutrients become increasingly possible in this context, as well as the development of micro-enterprises through a decentralised network of food producers.

5.2.4 Future challenges and localisation

A critical aspect for consideration is the end of cheap oil (raised in Chapter Two, Section 2.2.3) and the associated impacts it will have on local farms, from inputs through to transportation. Whilst this can be considered an opportunity to localise production and build a stronger local food economy, the transition will certainly have impacts on local food and livelihood security. The majority of inputs on most farms in the region are derived from fossil fuels (such as fertilizers) and the rising cost of fuel has already further narrowed the profit margins of both small and commercial farms dependent on these inputs (Peters *et al*., 2008:02). Without adequate preparation, the transition to a low energy input future could have severe impacts on the community of Stellenbosch currently unprepared for such a shift, and especially on the poor and most vulnerable residents already living with food and livelihood insecurity.

In the context of peak oil, climate change and growing demand from population growth, Stellenbosch will have to prioritise local food production to ensure resilience against future shocks and stresses. The transition from fossil fuel dependency to post-oil communities will carry significant social and environmental costs if preparations are not put into place now to promote strong and resilient local communities. Such preparations will require small but strategic investments in the short term to avoid devastating human (as well as financial) cost in the long term. In light of both the impacts of the modern food system and benefits of local food economies as highlighted in Chapter Two, Stellenbosch could become more sustainable, equitable and resilient through building a stronger local food economy. A set of recommendations are presented below that would guide a transition towards sustainability through Stellenbosch's food system.

5.3 Recommendations

For a community based approach to promoting sustainability through the food system, within the context of a predominantly modern global food system, the key recommendation for Stellenbosch is to promote a stronger local food economy. This could be achieved in part through the set of recommendations for the Stellenbosch food system presented below and further recommendations will emerge from future scholarship.

5.3.1 Increasing local production

Increasing production output of key food produce, specifically vegetables, fruit and nuts as well as chicken, fish, milk and eggs through targeting programmes to assist local communities and emerging farmers with access to land, resources and support is critical. This includes prioritisation of food production in spatial planning (taking into account urban growth), including:

(i) *Productive use of urban space*: including raised beds (or *organoponics*), rooftop gardens, common greens, sections of parks, schools, communal centres and backyards or allotment gardens as well as self-provisioning at factories, offices and businesses and suburban farms around urban perimeters. If Stellenbosch were to allocate only 10 percent of urban space towards urban agriculture, a minimum of 4 620 tonnes of vegetables per annum could be produced from within the urban boundary. Urban agriculture activities can range from community gardens to productive enterprises and market gardens that contribute to both local production and the local economy.

(ii) *Land reform to increase local production*: would serve to secure food for local consumption whilst creating employment and stimulating the local economy. This will require extensive support to be successful and investment should be considered in the context of hidden subsidies that other forms of agriculture currently receive. The cooperative model has proved successful in many countries for small-scale and emerging farmers to pool together resources and share support but requires support in the form of building management capacity. Centralised packaging and transport nodes should be invested in as public serving infrastructure to assist emerging farmers in getting their produce to market. These could be coupled with learning centres to build new systems of agricultural skills and knowledge. Targeted skills development programmes for emerging farmers on agroecological methods (thereby reducing dependency on fossil fuels and building resilience to climate change), marketing skills (to local markets) and business management are critical, and should be invested in for the development and security of both the farmers and the wider community (Pretty, 2001:11).

The IAASTD stresses the need to strengthen local food systems, buffering them against outside shocks, by stabilising production and increasing food security (IAASTD, 2008:18). Supporting local production and the wider local food system for both food and livelihood security are recognised as critical in the findings of the IAASTD, who recommended “investments in infrastructure and facilitating access to markets and trade opportunities, occupational education and extension services, capital, credit, insurance and in natural resources such as land and water” (IAASTD, 2008:11).

5.3.2 Building local distribution chains

Local economic development can be realised by increasing the production of food locally as well as localisation of food processing, distribution and retail that forms part of a wider local food movement for Stellenbosch. As identified by Marsden and Smith (2005:440), “sustainable wealth creation and local economic development require new entrepreneurial initiatives that focus on

investing in the local environment, creating / strengthening local institutions and employing people and their resources" (Marsden & Smith, 2005:441).

Different local food economy initiatives such as CSAs, local markets and consumer cooperatives (detailed in Section 2.5.1) are critical in supporting locally grown produce in reaching consumers more directly and effectively. A local distribution hub for locally produced foods should be established to assist both local farmers and consumers in connecting more directly and maximising the benefits of central coordination. By connecting local consumers more directly to the food economies that support them and the individuals behind that food economy, closer bonds can be forged within a community around local food. There are also opportunities for local value adding enterprises (such as canning or frozen foods) that not only stimulate the local economy further, but also assist in maintaining a supply of local fresh produce throughout the year.

5.3.3 Local movement engaging consumers, focussing on nutrition

In order to facilitate the building of a stronger local food economy, a wider local food movement should be promoted in Stellenbosch. A campaign premised on 'Local is Lekker'[68] is being proposed by local shop owners in Stellenbosch to support local produce from a community development, cultural heritage and local tourism perspective. This campaign could be extended further to target local households as well as businesses and institutions in the Stellenbosch region. Procurement policies for locally produced food would be strategic in establishing a growing demand for local produce and a core recommendation for consideration by the local tourism sector and major institutions that dominate the Stellenbosch economy. The campaign should also address and promote issues of nutrition through schools and community based organisations.

Initiatives commonly associated with vibrant local food economies that could support a campaign of this nature include guides to local and seasonal produce, school education programmes, chef and farm partnerships, harvest festivals and local food events (Pinkerton & Hopkins, 2009). Furthermore, there is an opportunity to strengthen the local food economy through promoting agri-tourism, providing both locals and visitors with an experience of the unique 'flavour' of Stellenbosch beyond the famous wines that originate from the region. Agri-tourism can both stabilise the incomes and increase revenue streams of farming communities (Nowers, 2007:04). Providing communities with the opportunity to engage with farmers and the production system through farm visits increases awareness on critical food system as well as broader sustainability issues.

Achieving food sovereignty and long term sustainability, which safeguards the livelihoods of the millions of families relying on agriculture, will require us to transcend modern understanding and

[68] *Lekker* is a popular Afrikaans word originally used to describe 'tasty' food but now commonly used to refer to describe something as 'very nice' or 'cool'.

approaches to agriculture. This will only be achieved if we embrace a more transdisciplinary approach which recognises both the complexity and multiplicity of food systems (IAASTD, 2008). This will rest on valuing agricultural knowledge systems and technology, and require us to become wiser and more creative in our solutions to the many challenges presented with navigating a new path towards achieving real development which is indeed sustainable. A key recommendation in preparing the community of Stellenbosch for a more sustainable future with a gentle transition into a low energy future is through building knowledge systems that promote learning for change (Pretty, 2002). Feenstra (1997:34) identifies leadership, collaboration and civic renewal as crucial in building stronger local food economies linked to equitable and sustainable communities. Learning through experience has been highlighted as one of the most meaningful methods of shifting behaviour and again points to the importance of connections with local food systems that allow opportunities for such engagement. In this way, local food economies are as much about the flow of knowledge and social capital as resources, as about the flow of food itself.

5.4 Opportunities for further scholarship

Several opportunities for further scholarship have been identified in the absence of primary data, reliable secondary data or recent research for several sectors of the Stellenbosch food system. Opportunities for further scholarship were identified in Chapter Three and are presented below.

5.4.1 Production sector research

A recommendation for further research is detailed mapping of current agricultural production for the Stellenbosch Municipal Area for each parcel of land (i.e. erf by erf). This would require detailed surveys that could then be mapped spatially using GIS. This research would be strongly complimented by mapping agricultural potential of the total land area based on soil condition, water availability and climatic conditions. Further research based on these findings could then be conducted on suitable land use and crop combinations as well as potential for livestock production. The mapping exercise should include the potential for food production within urban boundaries.

5.4.2 Distribution sector research

Mapping flows of food within Stellenbosch would be a highly complex and time consuming research undertaking. The ideal situation would be the establishment of an accounting system across production, distribution and retail sectors with reporting to a central management agency that would enable tracking of food flows for the Stellenbosch region. This would include, as a minimum, tracking where all Stellenbosch producers sell their food to, where all Stellenbosch retailers source their food from and where consumers in Stellenbosch purchase their food. In the absence of this system, further research on specific food products and the distribution thereof

would all contribute to an increased understanding of the dynamics of the Stellenbosch food system and identification of opportunities for promoting a stronger local food economy.

5.4.3 Consumption sector research

There is a significant opportunity for further research to establish a representative profile of current consumption patterns for the Stellenbosch region. This would require primary data capture through surveys and demographic profiling. Furthermore, research to compile a recommended nutritionally optimal diet for the Stellenbosch region, based on local requirements and preferences, would be critical in identifying more accurately areas for intervention that would promote greater food security for the Stellenbosch region. Further research should also be carried out on targeted programmes for improving food security in the Stellenbosch context.

5.4.4 Local food economy specific research

There are opportunities for further investigation into current local food economy initiatives (including local markets or farmers' cooperatives) operating in the Stellenbosch region as well as surrounding communities. In-depth research of the case studies highlighted to document business models and key findings would also contribute to a better understanding of the growing local food movement in the Stellenbosch region.

In-depth market analysis research on further opportunities for local food economy initiatives within different sectors should be investigated. This could include opportunities for promoting a stronger local food economy through local restaurants and hotels in the tourism sector, catering for the large student population at the University as well as local schools and opportunities for engaging local households into the local food economy.

5.5 Chapter summary

The Stellenbosch population is currently not consuming enough produce by volume or suitable food group to ensure food security, and several communities are currently classified as food insecure. Stellenbosch has the productive potential to produce enough food to provide a sufficient volume and diversity of food so as to ensure food security for the entire Stellenbosch community.

The main production focus of Stellenbosch is currently around export produce that does not contribute to local food security but does play an important role in providing jobs through primary and secondary industries. Questions have been raised around equality promoted through these jobs and appropriate land use, with the recommendation that local wine estates should rather focus on differentiated and high quality wines that can survive in the globalised market and not force lowering of production standards in order to compete. Wine estates should be diversified into food production for local consumption where appropriate and further research is warranted for different

regions within Stellenbosch on appropriate land use that considers impacts on food security, livelihoods and the supporting natural environment. Urban agriculture through food garden allotments and community food gardens also has an important role to play in supporting sustainable community development for the Stellenbosch region.

Localising the food system can promote greater food, livelihood and environmental security that can overcome limitations of the modern food system and the impacts of unregulated globalised trade. Through a network of diversified small farms, emerging farmers are seen to have a critical role in building a resilient and vibrant local food economy that also addresses the legacies of poverty and inequality in the region. These are often the farmers who also experience the greatest challenges as local producers. Overcoming these barriers will include addressing challenges around land reform, limited water resources, economies of scale and food safety regulations, through stronger community and institutional support. Of critical importance is supporting a fundamental shift in consciousness around food systems and the building of new knowledge systems through multiple education and awareness raising programmes.

Stellenbosch has the potential to realise a vibrant local food economy but requires a strategic programme aimed at realising this for all Stellenbosch residents, which recognises the complexity of the food system and the potential to realise multiple development objectives through collaborative efforts.

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